

# RAILROAD GAZETTE

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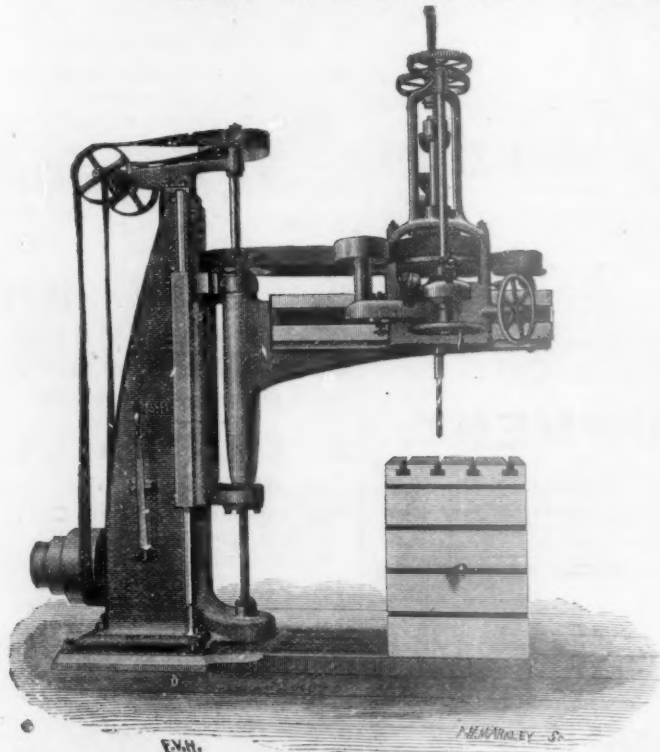
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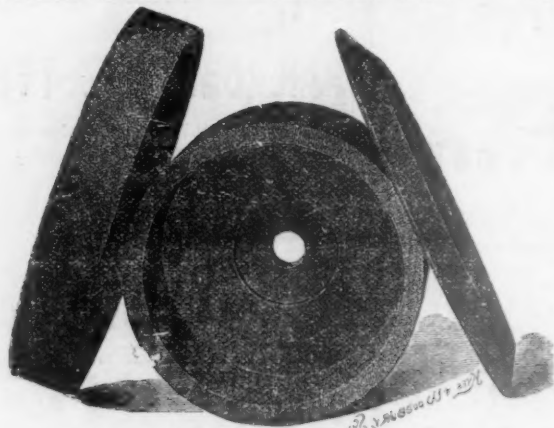
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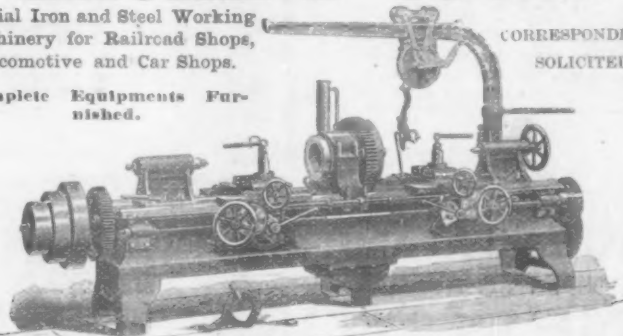
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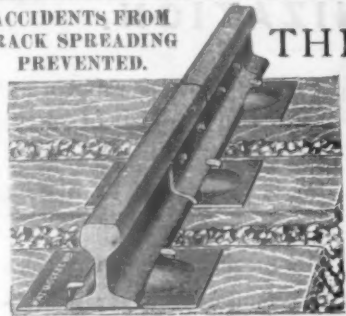
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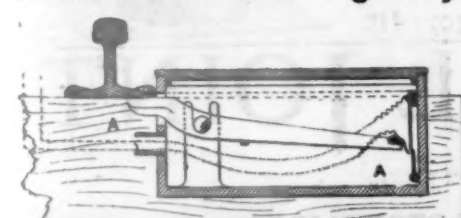
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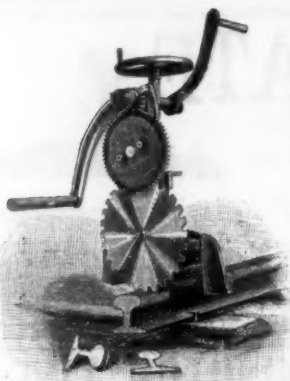
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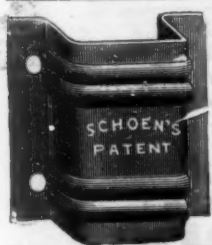
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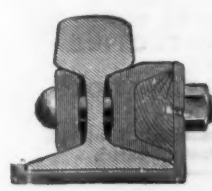
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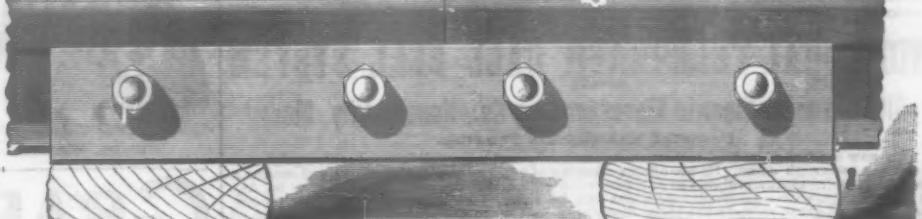
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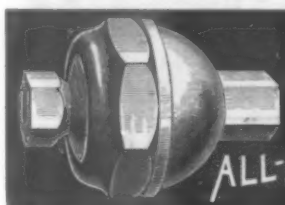
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Morris Sellers & Co., Chicago. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
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<b>Wash 1 Tape</b> Bryant & Barby, 69 Milk St., Boston. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
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<b>Wash 1 Tape</b> Chicago & Alton	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Chicago, Burlington & Quincy	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Chicago, Milwaukee & St. Paul	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Chicago & Northwestern	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Chicago, Rock Island & Pacific	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> C. & N. D.	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Housatonic Tunnel Route	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Illinois Central	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Lehigh Valley R. R.	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Michigan Central	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Missouri Pacific	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> New York Central & Hudson River	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> New York, Lake Erie & Western	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> New York & New England R. R.	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
<b>Wash 1 Tape</b> Pennsylvania	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....	<b>Wash 1 Tape</b> Schuttler Mfg. Co., Hartford, Conn. ....
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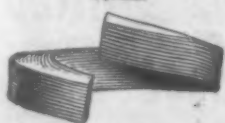
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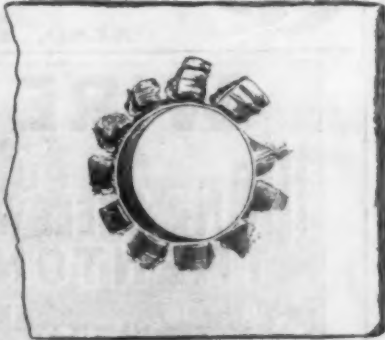


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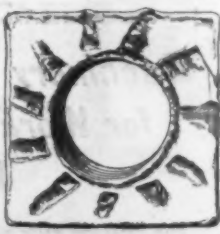
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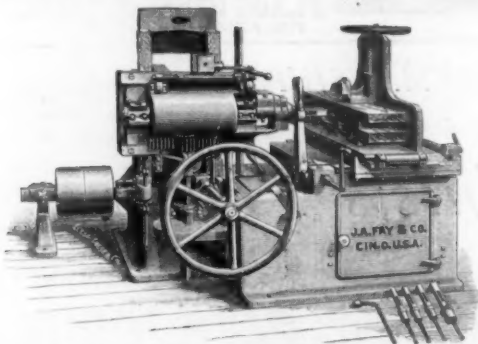
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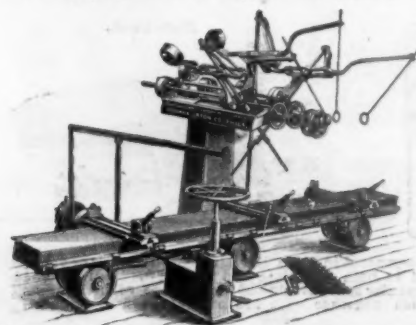
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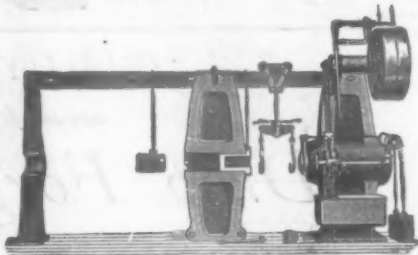
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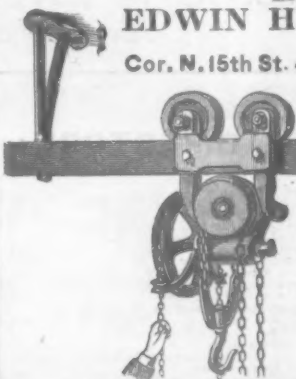
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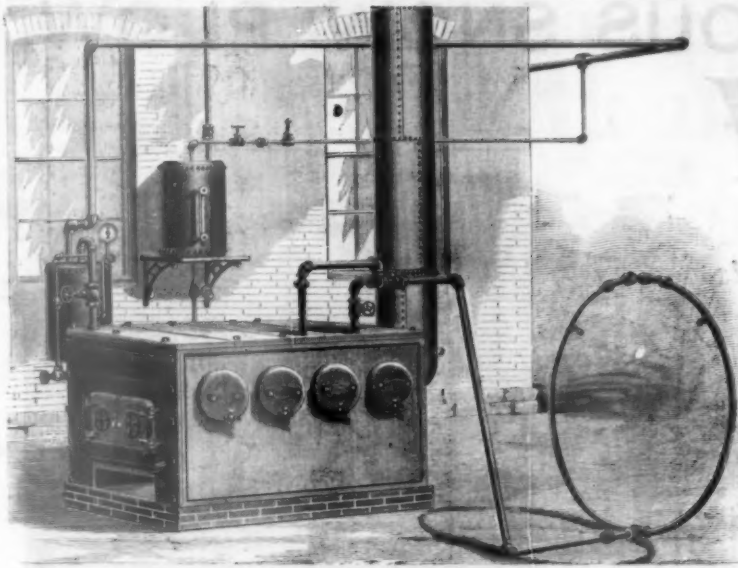
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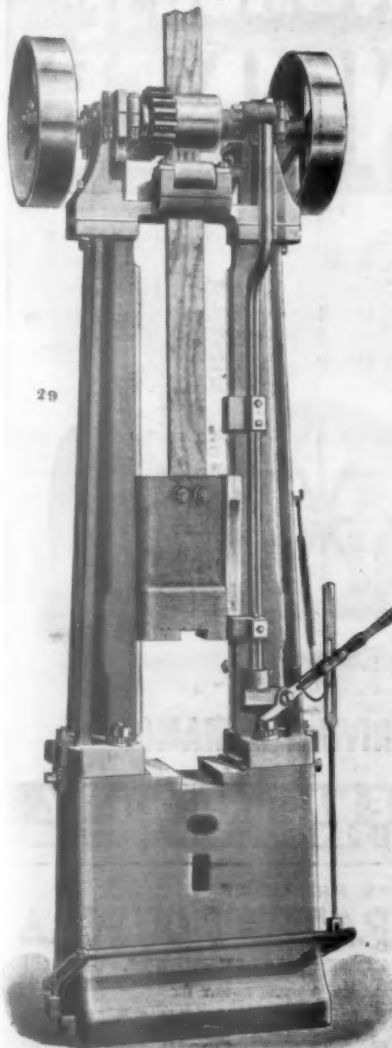
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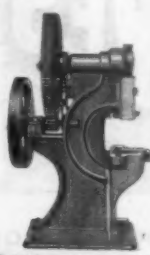
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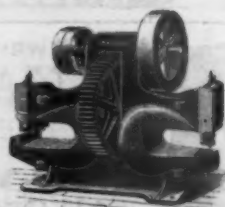
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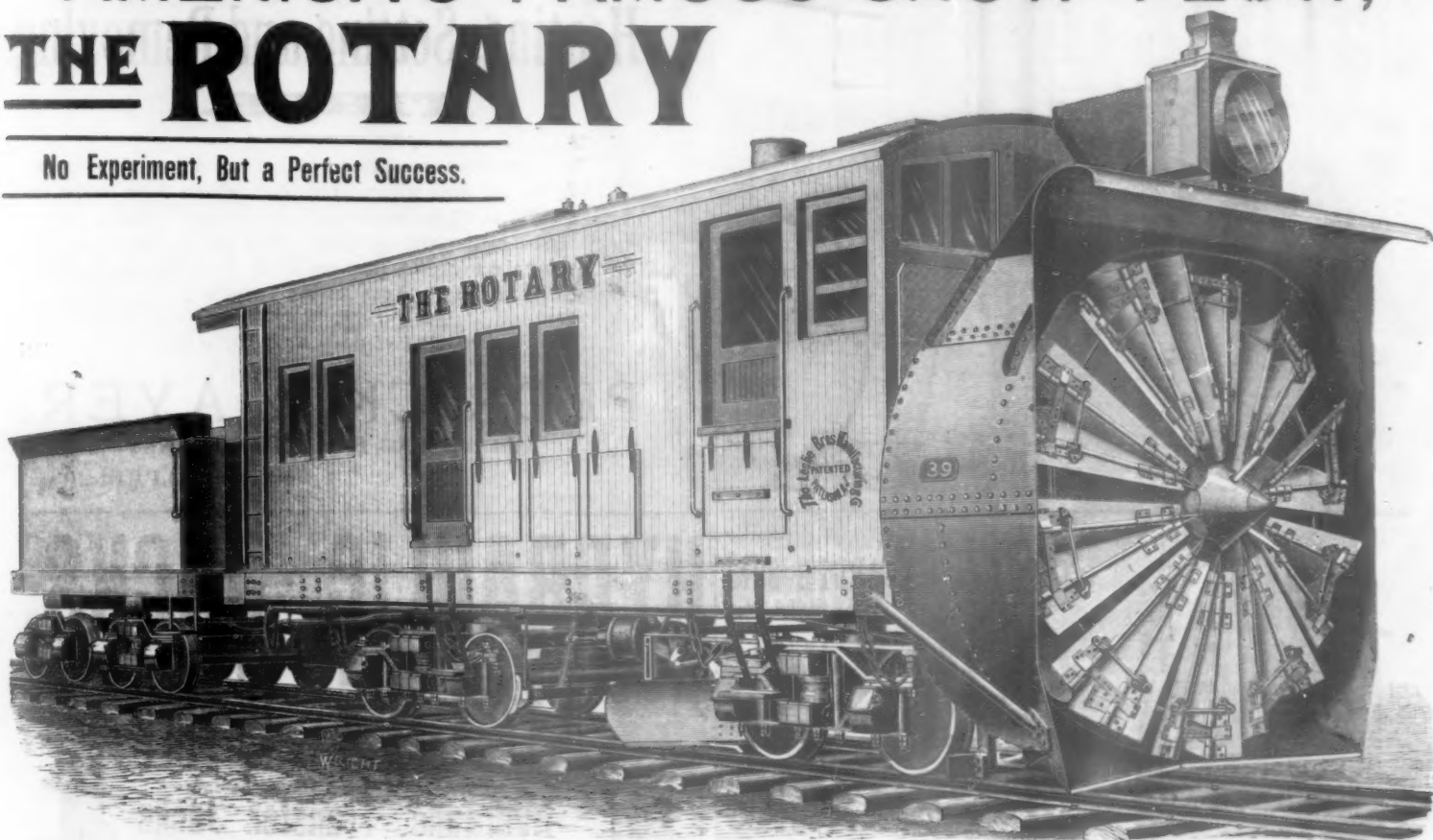
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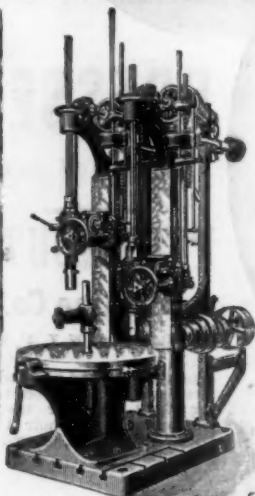
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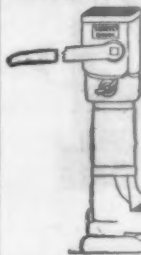
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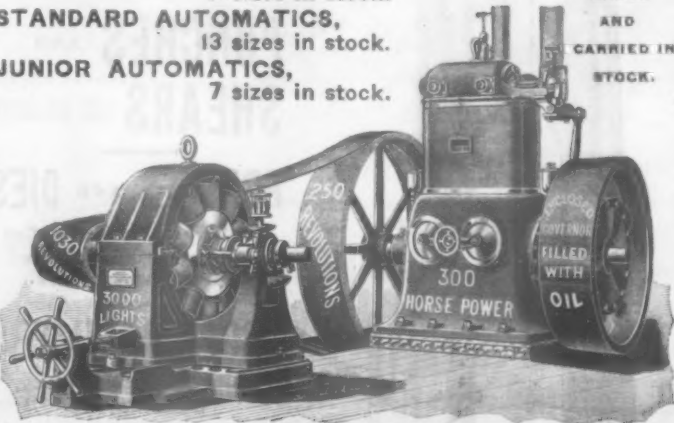
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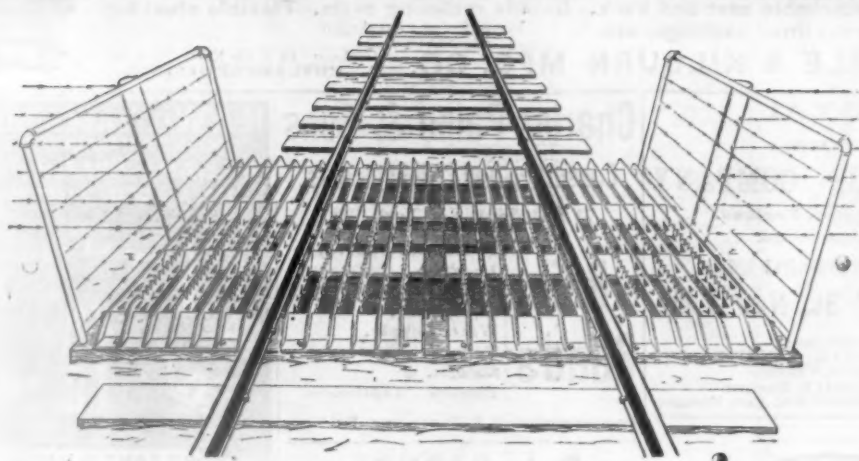
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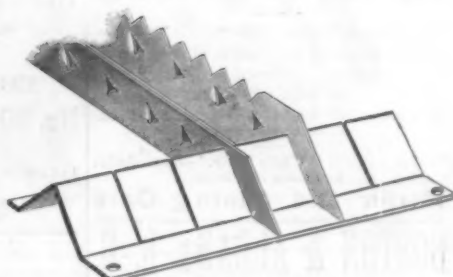


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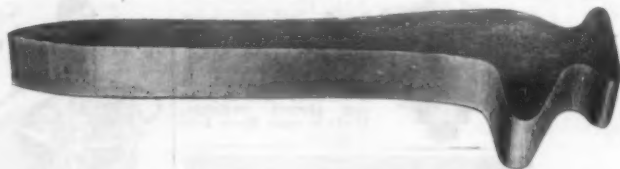
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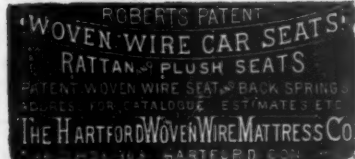
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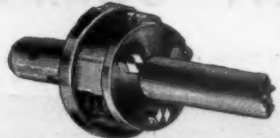
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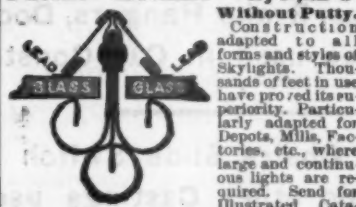
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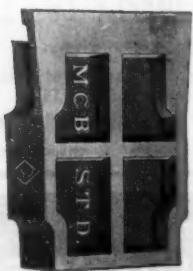
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**No. 6.** Official report of breakages among 10,676 "Standard" Couplers on New York Central & Hudson River Railroad, for 14 months, from Sept. 1, 1890, to Nov. 1, 1891:

Date.	Drawheads.	Knuckles.	Date.	Drawheads.	Knuckles.
September, 1890, -	- 8	49	May, 1891, -	- 13	100
October, " -	- 8	81	June, " -	- 28	110
November, " -	- 43	147	July, " -	- 13	72
December, " -	- 50	131	August, " -	- 19	104
January, 1891, -	- 22	116	September, " -	- 21	73
February, " -	- 66	122	October, " -	- 18	112
March, " -	- 63	172			
April, " -	- 51	176	Total, -	- 422	1,568

PERCENTAGES OF BREAKAGES FOR ONE YEAR: DRAWHEADS, 3.39 PER CENT.; KNUCKLES, 12.54 PER CENT.

These couplers were not run in solid trains of stock cars or transportation companies, but were mixed promiscuously with link and pin drawbars.

The percentages deduced from the above show that the number of broken knuckles for the past 14 months gives an average life for the 10,676 Knuckles of about eight years, and for the Drawheads about 30 years.

The number of breakages per month for the last four months has decreased to less than 70 per cent. of that for the previous eight months. With the Drawheads this number has been reduced to about 40 per cent. of that for the previous eight months.

The record of larger breakages from November, 1890, to April, 1891, is susceptible of some explanation.

Among other causes brittle and improperly annealed steel and cast-iron Knuckles not bearing our trade mark, "(D)," and sold to foreign roads for replacements on their lines by unlicensed and infringing manufacturers.

The above are the official records of the N. Y. C. & H. R. R. R. Co., and are corroborated by their returns of scrap to us. They are taken from main line cars, and do not include those of leased lines, transportation companies or stock lines.

We equipped in February and March last cars of the N. Y. C. Live Stock Express Co. with 800 "Standard" Couplers, and up to this date no Drawheads and but one Knuckle have been returned to us. There must be more somewhere which have not yet reached us, but as they are returned we will publish the records.

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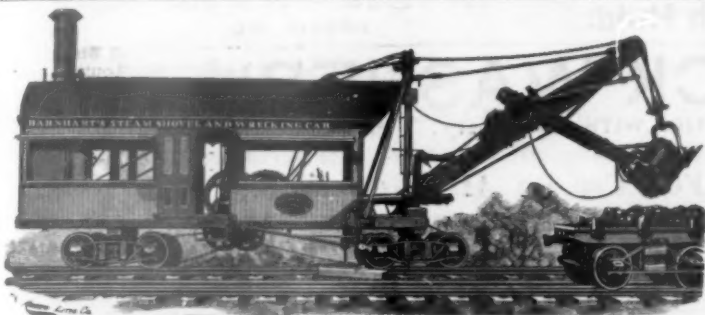


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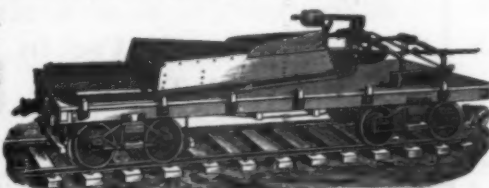
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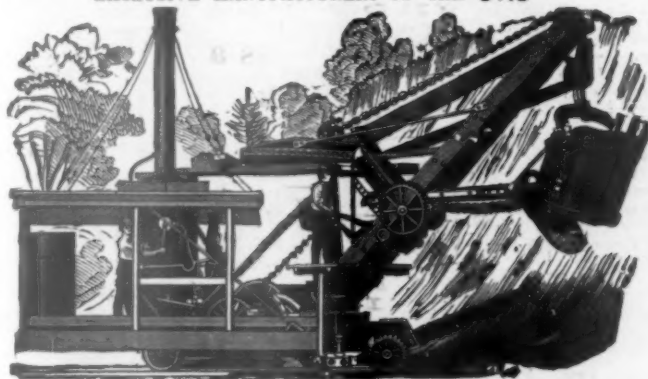
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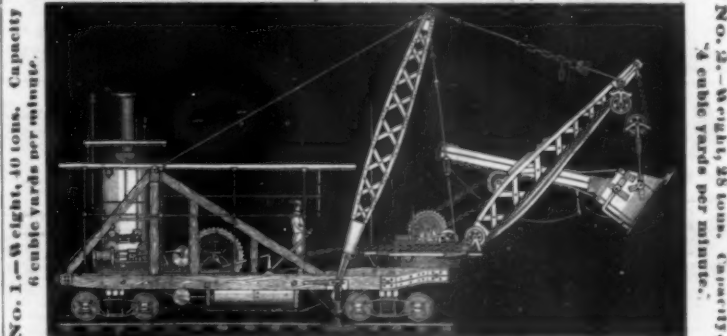
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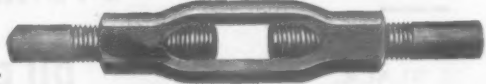
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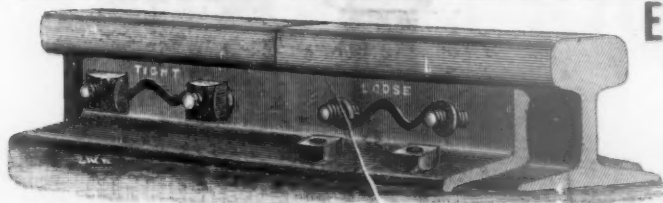
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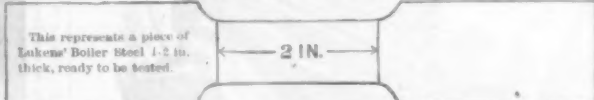
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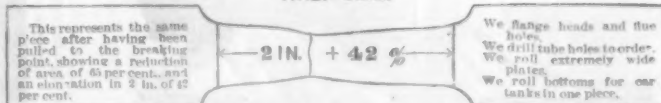


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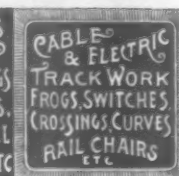
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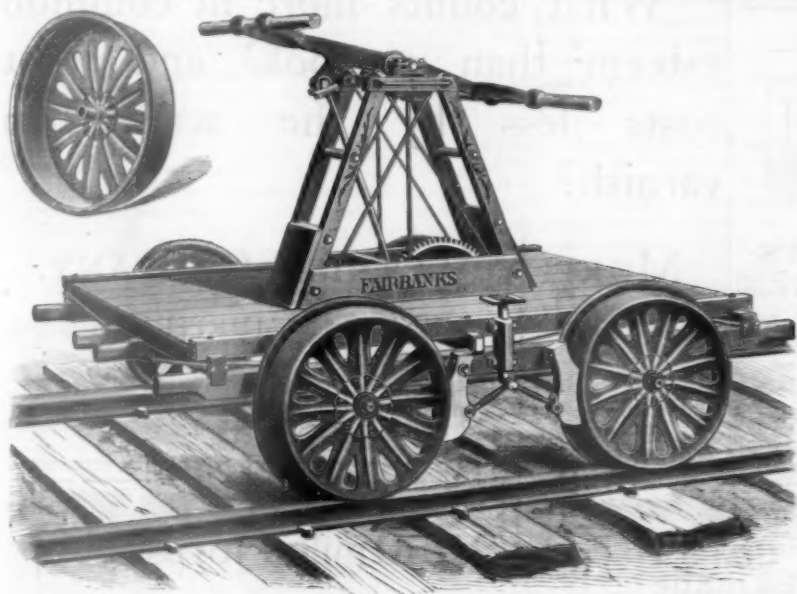


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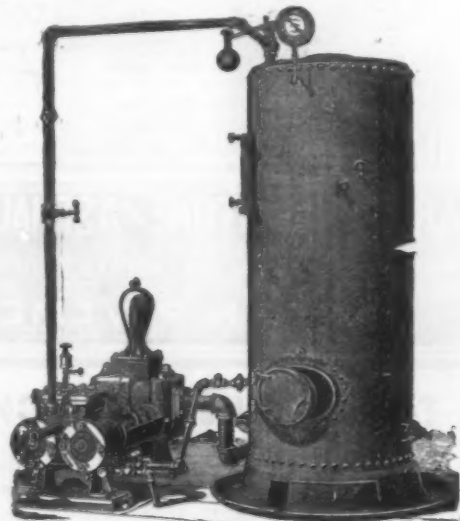
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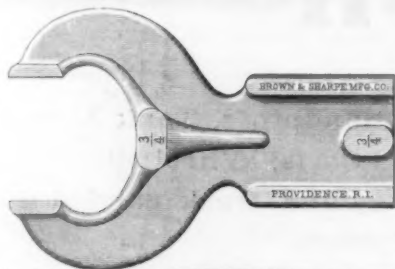
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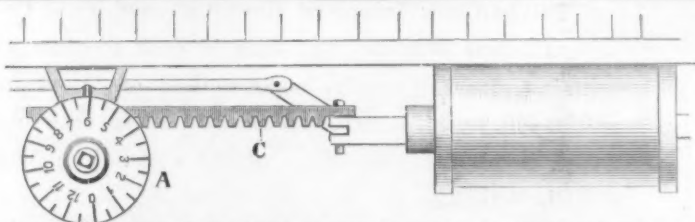
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FRIDAY, JAN. 8.

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## Contributions.

## Concerning Frogs.

CHICAGO, Dec. 26, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I desire to bring to your attention a little detail in the manufacture of frogs which I think of some little merit. It is making the end of one of the wing rails a little longer than the other. Assuming the lead for a No. 9 frog to be 85.5 ft. we use the following material: Switch



point 18.0 ft., two 30-ft. rails 60 ft., frog from end to point 7.5 ft. Now, this is the distance measured along the main line track. The lead is obviously longer, say 2 in. Using the same material for it, what is the result? The connecting bars are thrown out of square considerably, making a bad looking job, which should not be tolerated.

The sketch shows this in an exaggerated form. By making the wing rail B the necessary distance longer the trouble vanishes.

ELI MEWOL.

## Diagram for Draw Span Reactions.

KANSAS CITY, Mo., Nov. 12, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Some time ago, having a number of large draw spans to design, and becoming heartily tired of computing for each case the reactions due to single, balanced loads, I conceived the idea of making a diagram that would give quite accurately any end reaction for any case that would be likely to occur in practice. The method that I used for computing these reactions for balanced loads is that established by Burr in his "Stresses in Bridge and Roof Trusses" for the case of "partial continuity" with rim bearing.

It will be observed in Burr's demonstration that the ratio of length of centre panel to length of one arm is a factor that aids in determining the reactions. Of course this ratio varies somewhat for different cases, but the variation is so small that no error of any magnitude will be made by assuming the ratio constant. The correctness of this statement can be proved only by figuring out the reactions for several cases which would be likely to occur in practice.

My diagram was prepared by plotting on cross-section paper the end reactions for balanced loads from a number of old designs. It has since been tested by other engineers, and has been found to give correct results. Even if there were any appreciable error, caused by variation of the ratio that is assumed to be constant, it would not be by any means so great as the errors that must result from the very loose approximations made in establishing the ordinary form of the equation for the "Theorem of the Three Moments."

The diagram has proved so useful in my practice that

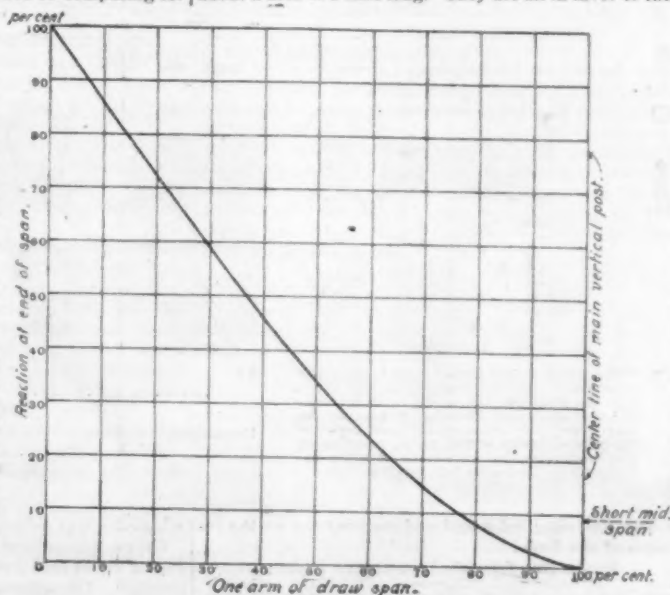


Diagram for Draw Span Reactions.

east bound traffic, and being so short do not restrict the weight of west bound trains as they can be passed by "running for the grade." Nevertheless these humps will be taken out as fast as possible for of course they are objectionable in that they cause break-in-two accidents.

From Richmond to deep water at Newport News, the line is again undulating with maximum grades east bound of 35 ft. per mile, and west bound of 42 ft. These maximum grades are short but the broken profile limits

I send it to you for publication in the hope that it may prove useful also to other members of the profession. A very neat and valuable series of experiments might be made by some professor of civil engineering who has time to spare, by building a large-size model of some modern American draw span, for instance that of Mr. Bolter's Thames River Bridge, and weighing the reactions for various loadings. The results would prove or disprove the correctness of the theories upon which American engineers are to-day designing draw spans.

J. A. L. WADDELL.

## Notes on the Chesapeake &amp; Ohio.

There are several facts which give to the Chesapeake & Ohio peculiar interest. In October, 1888, the property was turned over by the Receiver to its present proprietors. At that time the Chesapeake & Ohio proper extended from Phebus to the Big Sandy, 510.8 miles. The physical condition of this property was wretched. The track had been allowed to run down, and, although the permanent way included very fine masonry and some remarkable rock and earth work, a large part of the track had never been ballasted. The rolling stock, Dec. 31, 1887, included 163 locomotives, 67 passenger service cars and 6,458 freight cars. The reorganized company set to work at once to carry out a most comprehensive scheme of improvements, recognizing as it did that this might be made one of the best lines between the Mississippi Valley and tidewater, and that it would control an immense coal traffic whenever it was in condition to carry that traffic economically.

The grades from Cincinnati to Clifton Forge in the eastern foothills of the Alleghenies are very light. The western slope of the Alleghenies is ascended with maximum grades of 30 ft. to the mile, and nothing heavier than this is encountered between the summit and Cincinnati. The grade down the eastern slope as far as Clifton Forge nowhere exceeds 60 ft. to the mile. But going eastward from Clifton Forge by the old line, or what is now known as the Richmond Division, very heavy grades are encountered. The maximum is 74 ft. to the mile east bound and 80 ft. west bound. Not only are the grades heavy, but the profile is undulating, and even after the mountain are left there is a very broken grade all the way to Richmond, running up to 45 or 46 ft. per mile east bound.

In 1889 the Chesapeake & Ohio Co. acquired the Richmond & Allegheny Railroad which runs along the James River all the way from Clifton Forge to Richmond. This is known as the James River Division and gives the system a wonderfully favorable line. The grades are all in favor of east bound traffic and they are extremely light. The opposing grades eastbound are so few and light that they may be ignored. Going west on this Division very short grades are found near Clifton Forge of 10 ft., 19 ft. and 22 ft. per mile. This profile continues for 30 or 40 miles, but in much the greater part of this distance the grade is not over 3 or 4 ft. per mile. Further east the maximum grades against westbound traffic are 7 or 8 ft. and of these there are very few. The profile shows the average grade between Richmond and Clifton Forge by the James River Division to be 4.2 ft. per mile. As this line follows the James River Canal very closely there are a good many humps in the profile where locks are passed. These have grades of 1 per cent. and are about a fifth of a mile long. They are all in favor of the

the maximum trains to fewer cars than can be hauled over the James River Division.

The line as it now stands includes, beside the original Chesapeake & Ohio the Ohio River Division (including the Covington & Cincinnati Bridge line) the James River Division and 36.5 miles of branches; total 933.9 miles. The company also has trackage rights into Washington over the Virginia Midland and runs its own trains direct to Washington. Certain of its passenger trains are run solid over the Pennsylvania to New York.

A continuous low grade line from Cincinnati to Newport News was established by the acquisition of the Richmond & Allegheny and of the Ohio River Division from Cincinnati to Ashland, which was completed in 1888; but to make the property remunerative it was necessary to spend a large amount of money on track and equipment. This has been done and is still going on. Everything that could be earned in excess of fixed charges, has been poured into improvements, and the result is very apparent to one who goes over the line. The main line from Charlottesville to the Big Sandy, over which the fast passenger trains run, has been entirely relaid with 75-lb. steel and ballasted with stone. As this work is progressing continuously, it is difficult to say just how many miles have been ballasted with stone in the last three years, and how much has had new rail put down; but the rails purchased since the reorganization aggregate 43,000 tons. New ties, of course, have been put in and much wooden trestle has been filled with earth. Bridges of wood or iron have been rebuilt with heavier structures; passing sidings and yard tracks have been gradually increased in length until such tracks aggregate now about one mile to every three miles of main line track. Great care has been taken to make the track safe in every particular. The writer has never seen anywhere else so liberal a use of rail braces on curves as may be seen from end to end of this line. There is no interlocking except at the ends of double track sections, and the switches are not protected by distant signals, but all of the facing points on the Huntington and Richmond Divisions, and most of those on the other divisions, are provided with very well designed and conspicuous high targets, which by their form and fresh color, are the next best thing to distant signals.

Where new passing sidings have been put in at other places than at stations, towers have been put up at the middle of the sidings and operators are provided; in this way the number of operators along the line has been liberally increased, which greatly facilitates the movement of the very heavy traffic now passing over the road, and which also makes a good foundation for block signaling, which is sure to come before long if the road remains under its present management.

These improvements in the track are still going on, additions are being made constantly to the passing sidings and to the yard tracks, and where it is possible the sidings are so placed that they can be eventually brought into a second track. Beside these improvements in track and permanent way, several small stations and freight houses have been built; and at Clifton Forge a very fine repair shop has been erected and put into operation, which is fitted up with some of the best modern tools and with good methods of heating and ventilation. At this point also a large new round house has been built, and a handsome station and office building is now under construction.

The expenditures on rolling stock have been on an equally liberal scale. The equipment at the date of the last annual report was 252 locomotives, 151 passenger cars and 11,330 freight cars, and since the close of the last fiscal year the company has received 26 new locomotives, and will have 10 more before the end of January and 11 more about the first of March. Of course, these changes in numbers do not by any means represent the increase in capacity. The new locomotives are heavy consolidation and ten-wheelers. The new freight cars have been of modern type and capacity and are equipped with the air brake and the M. C. B. coupler. Incidentally it may be mentioned that great care is taken in making up trains to get the air-braked cars at the head of the train; this matter is closely watched by the superior officers, and we doubt if it is more systematically carried out on any road.

A very important part of the cost of the improvements in track, bridges, buildings and equipment has been charged to operating expenses. In the year ending June 30, 1891, the charges for maintenance of way and structures was \$1,530 per mile; in 1890 they were \$1,700. These charges include \$460,000 spent on bridges, culverts and trestles and \$248,000 spent on buildings and docks in the two years, and these expenditures it will be seen do not appear in the capital account. The charges to operating expenses for maintenance of equipment include \$1,700 per locomotive owned in 1890 and \$1,475 in 1891. These figures show the policy of the present owners to increase the earning power of the property with the minimum addition to the capital account. The cost of road and equipment has increased from \$89,012,127, June 30, 1889 to \$103,218,696 June 30, 1891, or just \$19,335,969. Of this increase \$14,000,000 was for the acquisition of the James River Division (Richmond & Allegheny).

The increased efficiency of the property may be understood from what has been said above. The most important step in this direction was the acquisition of the Richmond & Allegheny, which gives a line from Cincinnati to Richmond with 30-ft. maximum grades, crossing the Alleghenies and the Blue Ridge. From Richmond

to Newport News there are 35-ft. grades eastbound. Not many weeks ago a train of 1,000 tons of freight was taken from Cincinnati to Newport News, but one engine being used in any part of the run, except over the Allegheny Mountains. The next step beyond the completion of the low grade line by the purchase of the R. & A. was the improvement of the track, the renewal of bridges and filling of trestles to carry the heaviest engines. These improvements have been supplemented by the purchase of heavy engines; and to-day the road is in a position to do a great freight business with economy, although considerable work must yet be done to get the greatest results from the expenditures already made. The deep water terminals are not yet all that they must be; but favorable arrangements have been made with coastwise steamers sailing to New York, Providence and Boston, and with the Furness transatlantic line. In November and December of this year there were 20 scheduled sailings from Newport News to London, Liverpool, Glasgow and Havre.

The ability to handle freight has been followed by a great increase in tonnage and earnings. Some statistics of the last two years follow:

	1890.	1891.
Passengers.....	1,471,000	1,532,000
Passenger miles.....	71,561,000	81,908,000
Earnings per pass. train mile, cents.....	73.5	88.3
Tons carried.....	3,761,000	4,166,000
Ton miles.....	1,066,324,000	1,135,943,000
Earnings per freight train mile.....	\$1.20	\$1.38

The freight car movement in one ordinary day last November on the Huntington Division, New River District, was:

	Loads.	Empties.
East.....	443	0
West.....	107	379

On the Greenbrier District, the same day, the movement was:

	Loads.	Empties.
East.....	503	0
West.....	87	326

On the James River Division, Allegheny District, the figures were:

	Loads.	Empties.
East.....	480	0
West.....	41	413

This was before the heaviest grain and merchandise movement of this autumn, and car movement has since increased. It will be noticed that there was an important westbound business. In fact the tons carried last year were, east 2,765,000 tons, and west 1,401,000. A valuable part of the westbound freight is coal and coke from the New River and Kanawha districts; and of the total freight carried last year 50 per cent. was coal and coke. The possible amount of this traffic seems to be limited only by the capacity of road to carry it; but it will be understood that it is vital that it should be carried at a very low cost.

The chief improvements yet to be made to permit the fullest use of the property are additional double track, yards and passing sidings; a viaduct in Richmond to connect the James River and Peninsula divisions; a new station in Richmond, and, finally, considerable addition to the deep water terminals at Newport News. It is expected to have in operation 40 miles of new double track on the Greenbrier District before the end of 1892; and a large merchandise pier and new passenger pier at Newport News will be in operation by next autumn. We have no estimate of the probable cost of these improvements; but doubtless a part of it will be paid out of earnings, in continuation of the policy of the last three years.

Aside from all considerations of the economies of the Chesapeake & Ohio there are about it some points of singular interest. It crosses the Blue Ridge and the Alleghenies by roads built mostly by the state of Virginia before the war, and on which expense was not spared. The state did no work after the war. Some of the work is colossal. At Jerry's Run is a bank containing 1,100,000 cubic yards, said to be the biggest fill in the world; and near this is the Moss Run fill, containing 900,000. The rock cutting is tremendous, and the story is that the cost from Covington to White Sulphur, 22 miles, was over \$4,000,000. Upon the 17 miles across the Blue Ridge, including the tunnel, the outlay was \$1,700,000. It is not too much to say that no more formidable works, either in this country or any other, were undertaken by the engineers of the "fifties." Their names should not be suffered to pass into oblivion, and it would be a most graceful and appropriate thing if the great interest which now controls the line should erect in a conspicuous place a monumental stone with those names upon it. Crozet, Fisk, Ellet, Kuper, Shaw have gone over to the majority; Whitcomb still lives and is in the full practice of his profession.

From Clifton Forge to the summit 58 per cent. of the line is curves; and from Hinton to Hawk's Nest, going down the New River, 51 miles, the curves form 63 per cent. of the line. The traveler who goes over the road with his eyes and his mind open cannot fail to be deeply impressed by the boldness of the projectors and the skill of the engineers of the original lines and by the great promise of the present property.

#### Staybolts in Locomotive Boilers.

BY F. J. COLE,

Mechanical Engineer Baltimore & Ohio.

With the present construction of locomotive boilers it is not possible to eliminate entirely, by minor changes in design or better material and workmanship, its inherent weak points. The demands for steam are so great from

a boiler of limited size and weight that much more attention has been, and is likely to be, paid to its capacity as a steam producer than to the periodical failures of some of its parts. Indeed it is much easier to criticize its unmechanical construction than to suggest a remedy. Notwithstanding its weak points a locomotive boiler performs an enormous amount of work, generating five or six times as much steam from a given amount of heating or grate surface as an ordinary stationary boiler.

"Eternal vigilance" is the price of immunity from disastrous explosions. The comparative freedom from boiler failures is due almost entirely to careful inspection and frequent repairs. For instance, owing to the frequent breakage of staybolts in locomotive boilers it is customary to examine them periodically, testing each one by striking it on end from the inside of the firebox with a hammer, to ascertain by the vibrations of the sheets, or the sound, whether it is broken. On some roads it is the practice to make this test every week, on others whenever the boiler is washed out or the fire drawn. Some again have no stated time, testing them only when a convenient opportunity offers or leaving the matter entirely to the discretion of the master mechanic or the general foreman. Conditions of service and design of boilers govern the inspection so largely that no one set of rules will apply in all cases.

The importance of systematic tests cannot be overestimated, especially in certain types of long furnace boilers. The main point is not to allow the boiler to become dangerously weak through the breakage of several stays in one place before it is discovered and the bolts renewed. Even one broken stay in certain locations, when the boiler has been in service for some time, may, in a few days, cause others to be overstrained and broken.

The following form of report shows the manner of recording staybolts and boiler tests on one of our leading railroads:

Form 1032.

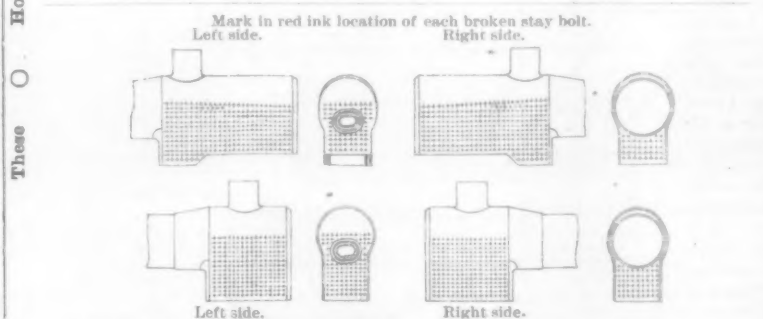
5,000-4-20-91.

### BALTIMORE AND OHIO RAILROAD COMPANY,

Report of Stay Bolts and Interior Examination of Boiler.

Of Engine No. .... At ..... Station,  
..... 189 ..... Examined by .....

NAME OF PARTS EXAMINED.	CONDITION IN WHICH THEY WERE FOUND AND REPAIRS TO SAME.
NUMBER OF BROKEN STAY BOLTS.	
FRONT HEAD BRACES.	
BACK HEAD BRACES.	
DOVE AND CROWN BAR BRACES.	
CROSS BRACES.	
CROWN BAR SLING STAYS.	
CROW FEET.	
SEAMS.	
SHELL.	
CROWN BARS AND BOLTS.	



The interior of all Boilers must be carefully examined by a competent inspector whenever the Flues are taken out, and the condition of all Braces, Crowfeet, Seams, &c., as they were found, noted on the lines opposite the printed names of the parts, mentioning also the repairs that were made to same before putting the engine into service.

To ..... Supt. M. P.  
Respectfully Submitted,  
..... M. M. or G. F.

The following rules and endorsement are on the reverse of the form.

#### RULES FOR TESTING LOCOMOTIVE BOILERS.

The boilers of all new locomotives must be subjected to an hydraulic pressure of twenty-five (25) pounds per square inch above their rated working pressure before going into service. The test must be made once a year for the first two years, and thereafter every six months.

When boilers are being tested, the foreman of the Machine Shop, having under his charge the repairs of locomotives, must attend personally, remaining outside, while an assistant examines the firebox from the inside.

A record of all tests must be made on this form, giving dates and anything worthy of mention, which must be signed by the Foreman and the person assisting.

The boiler must be heated to near the boiling point of water before the test is commenced.

Special examination of the staybolts of locomotives in service must be made whenever the fire is drawn, not less frequently than once every week.

An Inspector, especially trained for the service, must tap each staybolt from the firebox side, and judge from the sound which of them are broken.

When these examinations are made, there must be not less than thirty (30) pounds of steam pressure upon the boiler, which will produce sufficient strain upon the stay bolts to cause the separation of the parts of the broken ones. Should the boiler not be fired up the examination may be made after drawing all the water from the boiler, in which case the vibration of the sheet after striking the bolt will indicate any unsoundness. The latter test is preferable when it can be made without inconvenience.

He must mark the location of each imperfect bolt on this form; and report the same to the Master Mechanic, who will decide from the position of the bolts and the construction of the boiler, whether the locomotive must be withdrawn from the service.

No locomotive must be allowed to remain in service when there are one or more stay bolts broken in the top row.

B. & O. R. R. CO.

Report of Stay Bolts

and

Interior Examination of Boilers.

Engine No. ....  
Station.....  
Date..... 189.....

This report must be made promptly to Supt. M. P., who will forward the complete reports bound together for each month as soon as all are received to the Genl Supt. M. P. for examination and return to Supt. M. P.'s office for file.

#### RULES FOR TESTING STATIONARY BOILERS.

Stationary boilers carrying 100 lbs. pressure per square inch or over must be tested in accordance with the instructions given for locomotive boilers, including the examination of stay bolts.

Stationary boilers carrying less than 100 lbs. per square inch must be subjected to an hydraulic pressure of 50 per cent. in excess of their rated pressure once in every six months, and a special examination made of the stay bolts both before and after pressure has been applied in the manner prescribed for the examination of stay bolts of locomotives.

Stationary boilers of odd types, such as those used over heating furnaces, must be tested the same as other stationary boilers, so far as the pressure and dates of test are concerned, and must be examined with reference to the particular construction of each boiler.

It must be understood that the foregoing rules apply to all boilers, whether located at the shops or at outlying points, and that they are in the direct charge of the Master Mechanic in whose district they may be placed.

The dates of all tests and examinations must be promptly reported to Supt. M. P., giving also the general condition of the boilers, and noting any staybolts or braces found to be broken.

It is generally understood that staybolts break from repeated bendings, due to the unequal expansion of the firebox and boiler shell, the former being in contact with the intense heat of the fire, while the shell is kept much cooler by its exposure to the atmosphere. The difference in temperature causes the inner sheet to expand more than the outer. The bolt being screwed into and riveted over in the sheets, is more rigidly secured in the thick outer sheet. The furnace sheet expands, carrying the end of bolts with it; the comparatively cool outer and thicker sheet secures the end of the bolts so firmly that movement is next to impossible, consequently the stay has to bend. The thin hot furnace sheet allows a slight looseness in the fit, or a buckling of the sheet to take place, and therefore the bending movement is concentrated at the point

where the stay enters the outer sheet.

The maximum bending will occur in "lighting off" an engine full of cold water, especially if the circulation is sluggish. The minimum bending, due to the expansion of the plates, is during the time the steam is kept at a uniform pressure. Between these two extremes more or less motion will take place, varying according to the fluctuation of steam pressure inseparable with the ordinary every day service of a locomotive.

If it were possible to keep the temperature of the boiler and furnace nearly uniform, broken staybolts would be a rare occurrence, their life in all probability equaling the rest of the boiler. It has been observed that the service in which an engine is engaged has much to do with the length of time the staybolts will last and the number



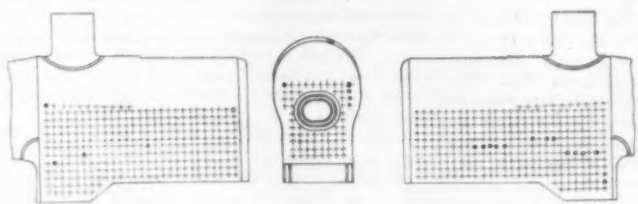


Fig. 2.

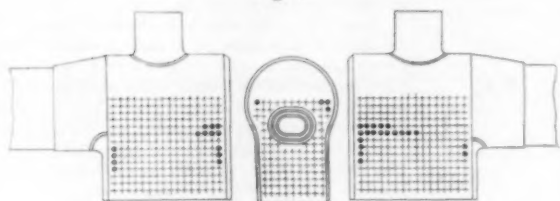


Fig. 3.

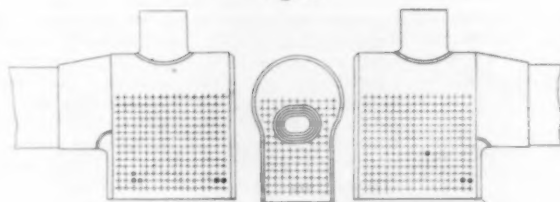


Fig. 4.

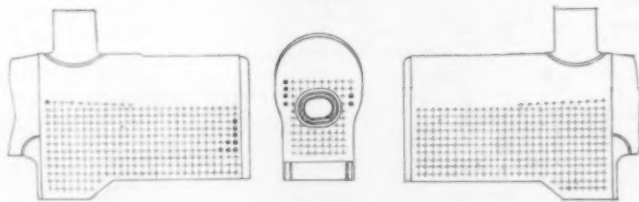


Fig. 5.

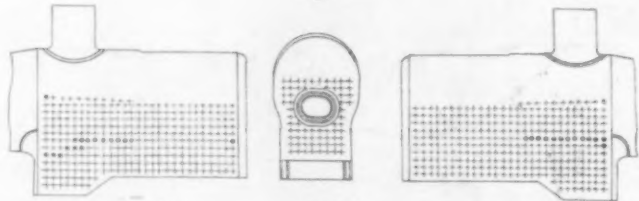


Fig. 6.

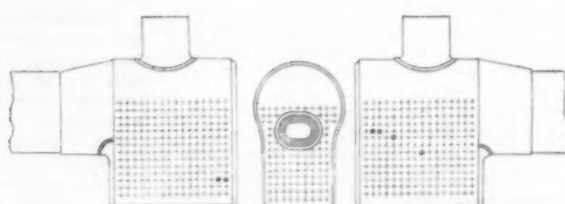


Fig. 7.

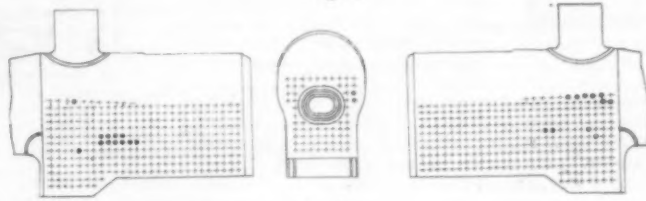


Fig. 8.

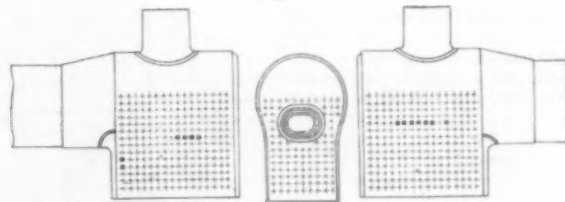


Fig. 9.

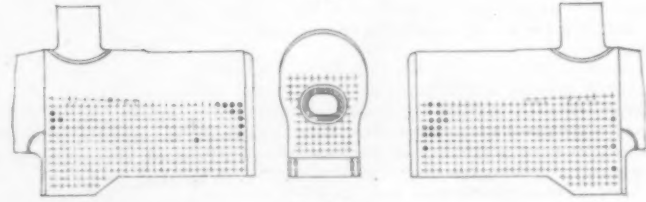


Fig. 10.

## DIAGRAMS SHOWING LOCATION OF BROKEN STAYBOLTS.

The Broken Staybolts are Shown by the Black Dots.

broken. Engines working on heavy grades show a much higher percentage of breakage than elsewhere, due no doubt to the intense heat of the furnace, the large amount of coal burned per hour, and the necessity of the engine exerting its greatest available tractive power until the top of the grade is reached; when the fierce blast ceases, the boiler is filled up with water and contraction of the heated surface takes place.

The number of bendings which an ordinary  $\frac{3}{8}$  in. staybolt of good iron, threaded, screwed and riveted into sheets of usual thickness, will stand, one end firmly fixed, the other moving  $\frac{3}{8}$  of an inch, is proved, by experiment, to be from 2,000 to 5,000 movements.

From actual reports of breakage, made at least every month, it appears that consolidation engines, with furnaces 120 in. long, working on heavy grades, cannot be relied upon to give over two years' service before the staybolts commence to break.

Out of 28 consolidation engines, built between January and December, 1888, no breakages are reported until March 19, 1890 when two bolts were broken, and Nov. 1, 1890, when four bolts were broken. In 1891, the third and fourth year in service, the breakages were much more numerous and frequent reaching, in the case of engines working on the mountain division, as high as from 200 to 450 slightly cracked and broken bolts, located generally as shown in fig. 11.

The record of ten passenger engines, with 72-in. furnaces between the frames and 54-in. wagon top boilers with crown bars, built in 1886, shows that no bolts were broken until 1891.

One radial stay, straight top, 55-in. boiler, 120-in. furnace between frames, built in 1886, shows no broken stays until September, 1890. This engine worked only on moderate grades.

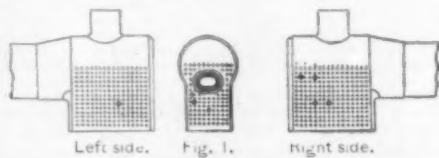
One straight top 52-in. crown bar boiler, 85 in. furnace between frames, built January, 1890, shows four broken stays, April, 1891. (Odd type of engine; no record of quality of iron.)

The number of engines reported for one or more broken staybolts for one month on a leading road is 9% per cent. of the total number of locomotives. This is supposed to be higher than the entire year would show.

The popular impression seems to be that stays break much more frequently in the top rows. This does not appear to be confirmed by a careful examination of many thousands of reports; the breakages are not confined to any one locality, but are scattered around in

the most bewildering way. Many break in all parts of the upper portion of the backhead, which, in the case of the top row, can probably be accounted for by imperfect or insufficient bracing; but when they occur just around the furnace door it is not so easy to explain. Similarly, in the case of breakage in throat sheet, and scattering breakage in side sheets 12 or 15 ins., or even less, above the foundation ring. A typical case is shown in fig. 1.

As this engine was comparatively new (not quite two years old) a satisfactory explanation is somewhat difficult to make. A slight variation of pitch of thread, however, between staybolt and tap, would cause some of the stays to be largely overstrained by drawing in the sheet at various points, relieving the surrounding stays and putting an undue strain on others. Usually staybolts are  $\frac{3}{8}$  in. in diameter, 12 threads per inch, diameter at root of thread, .767; effective area, .420 sq. in. The strain per square inch for various spacing and steam pressure is given below.



Spacing.	Area.	Steam pressure per square inch.						
		140	145	150	155	160	165	170
$4\frac{1}{2}$ + $4\frac{1}{2}$	20.25	6,750	6,991	7,232	7,473	7,714	7,955	8,196
$4\frac{1}{2}$ + 14	13.14	4,500	4,661	4,822	4,983	5,144	5,305	5,466
$4\frac{1}{2}$ + $4\frac{1}{2}$	18.06	6,020	6,235	6,450	6,665	6,880	7,095	7,310
$4\frac{1}{2}$ + 4	17.00	5,600	5,809	6,018	6,227	6,436	6,645	6,854
4 + 4	16.00	5,333	5,523	5,714	5,904	6,095	6,285	6,476

Staybolt iron should have a tensile strength of not less than 50,000 lbs. per square inch, with an elongation of not less than 25 per cent. in eight inches.

From the above table the greatest strain per square inch, at  $4\frac{1}{2}$  +  $4\frac{1}{2}$  and 170 lbs. steam pressure (proportions which would not be used in practice), is only slightly above 8,000 lbs.

Evidently the strains due only to the steam pressure have but little to do with the breakages, the combina-

tion of bending and tensile strains causing the final failure of the stay.

It does not appear reasonable to suppose that merely increasing the number of stays in a given area will greatly prolong their life, as it is only decreasing the least one of the destructive factors; an attempt to cure one of the symptoms, but not the disease itself.

In a large number of boilers carrying 160 lbs. steam pressure, built a few years ago, the  $\frac{3}{8}$ -in. stays were carefully spaced so as not to exceed 4 in. + 4 in. This was rigidly adhered to, even in the curved surface, joining the straight sides to the cylindrical portion, thus no stay supported an area greater than 16 sq. in.

After a lapse of three or four years—the engines being in all kinds of service—the stays commenced to break. They evidently had been bent backward and forward a great many times in that period by variations in temperature caused by fluctuations in steam pressure, banking fires, blowing out boilers, lighting off, etc., until the iron became crystallized through repeated over strains and finally broke.

The remedy, or more correctly, the prolongation of life, will (for no complete cure is possible with the present construction of boilers and fireboxes) doubtless be found in better designs of boilers, which will reduce the binding to a minimum, by various means, such as greater space between shell and firebox permitting longer stays, smaller diameter of stays spaced closer together, making a greater ratio between the diameter and length; and consequently a more flexible stay; the use of fireboxes above the frames, making straighter side sheets, and various other means of like nature.

A number of boilers having broken or cracked bolts, selected at random, from a great many reports made at the time the bolts were examined are shown in figs. 2 to 10.

It must not be supposed that all the stays shown above were broken entirely off. A number, where they occur in groups, were seen to be cracked after the removal of the broken ones detected by the hammer test. By cutting out one or more stays, those cracked in the immediate neighborhood can be seen by lighting up the space between the sheets by means of a gas jet or other means of illumination.

Generally, the greatest number of broken stays will be found in boilers with furnaces 9 or 10 ft. in length; or boilers of large diameter, with fireboxes between the frames, making a sharply curved side sheet. Often a

10-in. radius is used to unite the straight vertical side with the cylindrical portion.

The greatest number of stays in boilers of the latter class will be found broken, as indicated in shaded portions of the cut, fig. 11, commencing at the front and extending gradually back.

The characteristic fracture of staybolts is a crack, beginning at the root of the thread close up to the inner edge of the outside sheet, and extending entirely around.

This gradually deepens, until only a small portion of solid metal remains in the centre, whose ultimate strength is slightly less than the tensile strain due to the steam pressure; when this point is reached the stay breaks suddenly.

Fig. 11.

The dangerous feature lies in the gradual cracking, the deterioration in strength of an unknown number, and the overstraining of others already very much weakened by the sudden fracture of one or two.

Hollow staybolts are used in a limited way to show when fracture takes place. Their utility, however, is questionable, as too much reliance may be placed upon them and systematic inspection neglected, or the telltale holes become clogged up to such an extent that no leakage of sufficient magnitude occurs, to indicate, through the lagging, and jacket that fracture had taken place.

They are manufactured with a small hole passing through the entire length about  $\frac{3}{16}$ -in. in diameter, formed by rolling around a central core or mandrel. The cost per pound is about nine cents.

Another method of accomplishing the same result is to drill a  $\frac{3}{16}$ -in. hole about 1 in. deep in solid stays after they are screwed and riveted in place. This method appears to be cheaper and preferable, as the advantage of admitting air at all points and at all times in the furnace admits of considerable doubt.

A device by which, it is stated, 70 holes can be drilled in a day of 10 hours, is illustrated and described in the *Railroad Gazette*, May 29, 1891. Another drilling machine is shown in the same paper June 19, 1891, which is reported to have a capacity of 150  $\frac{3}{16}$ -in. holes  $1\frac{1}{4}$  in. deep per day. Taking the cost of drilling at two cents per hole, the comparative cost per stay would be about  $3\frac{1}{4}$  cents for drilled and  $4\frac{1}{2}$  cents for hollow—not including threading or putting in place.

On several occasions the writer has broken numbers of staybolts short off with a single blow from a freight car coupling pin or light hand hammer in old boilers which had been cut up, or from which the furnace had been removed, the iron breaking like and having a fracture similar to cast iron. In this connection the question naturally suggests itself, Would it not be better on classes of boilers showing frequent breakages, to drill out and renew periodically by means of suitable machinery all staybolts when engines are in for general repairs, renewing them every two, three, four or five years, according to the frequency of the fractures and the design or type of the boiler?

Although no comparative statement can be made from actual reports, owing to the different service, steam pressure, age, etc., it appears to be well sustained by general knowledge of their performance that small boilers with straight furnace and outside sheets, in which the furnace is but little, if any, wider at the top than the bottom, with the same length of furnace, do not show as great a percentage of breakages as larger boilers with sharply curved furnace and side sheets.

So far as the writer's experience and observation goes, very few breakages occur in crown sheet stays of radial stay boilers, or in the crown stays of boilers having the Bellpaire fireboxes. Their length is so much greater than the short stays below the crown, that the bending is distributed over their entire length, and not concentrated at any one point. In this respect they are entirely satisfactory, and compared with the use of crown bars, make a much lighter, cheaper and stronger boiler. The growing popularity of this type, especially of the radial stay, is shown in a tabulated statement published in the *Railroad Gazette*, showing that more locomotive boilers of the latter type were built in 1890 and 1891 than all other kinds combined.

These boilers, however, do not appear to make a more favorable showing regarding the breakage of short stays than those with crown bars. So far as the writer is able to learn, there is not much difference, when a comparison is made, between boilers of the same length of firebox and diameter of shell, working under the same condition and pressure of steam. Those built nine years ago for the West Shore road can be cited in confirmation of this statement.

Various attempts have been made to prevent the destructive bending, by means of ball and socket heads in the outer sheet, or other methods of allowing one end to move freely. The great cost of the devices, and the difficulty of making them steam tight prevent their general use.

Corrugated circular furnaces present one method of doing away altogether with the use of staybolts. For higher steam pressure and larger boilers this type of furnace, already used so extensively and successfully in marine work, and to a limited extent in Europe for locomotives, appears to possess sufficient merit to warrant its use, or at least its experimental use, for high pressure locomotive boilers.

#### The Improved Dowling Coupler.

The Standard Car Coupling Co. has now two forms of the Dowling coupler, both of which are made to meet the requirements of the Master Car Builders' standard and the pulling and drop tests of inspection. The couplers differ materially. They have only one point in common, and that is the peculiar pivot, which is the basis of the old Dowling patent, and the extension on the knuckle for the lock, which is the subject of a later

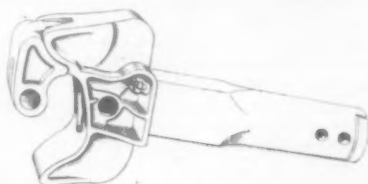


Fig. 1.

patent and was not contemplated in the old Dowling patent. Under this late patent two couplers have been built. One has been illustrated in the *Railroad Gazette* and is made heavy for the roughest kind of service. Its weight is about 206 lbs. Some weigh a little more, and others a little less. The second form is shown by the accompanying illustrations, and weighs about 175 lbs.

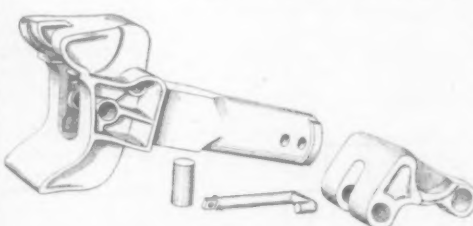


Fig. 2.

The knuckle weighs 54 lbs., the head 116 lbs., and the pins 5 lbs.

Fig. 1 shows the coupler complete with the knuckle closed. The lock lifter is protected from injury as it is surrounded by the buffer stop. Fig. 2 shows the coupler in detail. The lock consists of a perfectly plain piece of round rolled steel about 3 in. long. The knuckle has large bearing surfaces, and has the material so disposed as to make it probably the lightest and strongest form into which material can be put within the limits of de-

Fig. 3.

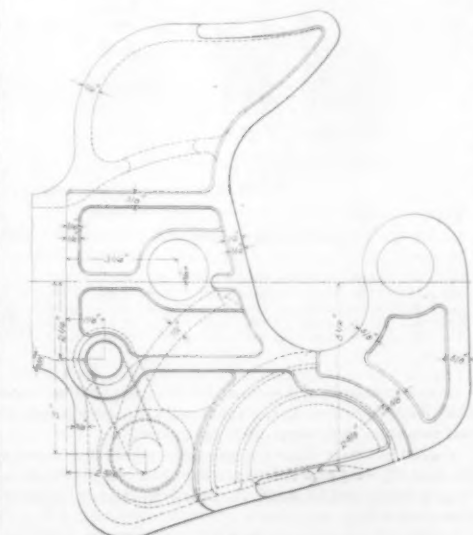
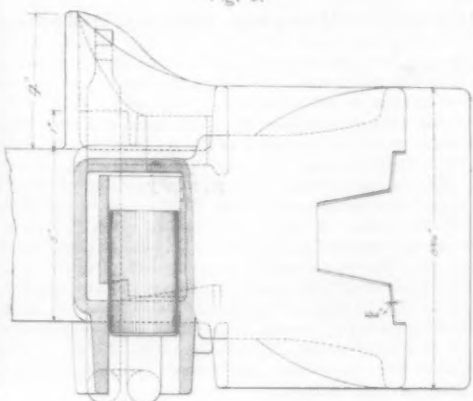


Fig. 4.

sign of this coupler. The operation of the coupler is best understood from figs. 3 and 4. Fig. 4 is a plan and shows the large segmental trunnion on which the knuckle rotates. The lock is best shown in fig. 3. It is simple and has a large wearing surface. It is lifted by the bent rod, clearly shown, which passes up through the coupler head from the bottom.

Couplers of this form, but not exactly to these dimensions, being much lighter, have been in use on several heavy grain cars on the West Shore road for four years without breakage or showing unusual wear. It is the success of those couplers which has led to placing the coupler here shown on the market.

One may ask why a coupler weighing 175 lbs. will stand the same tests in a pulling machine and under a drop hammer as other couplers that weigh much more; but the reasons are simple when understood. Malleable iron when thin and of good quality has a comparatively high tensile strength and ductility. Malleable iron founders claim that in order to make the malleable iron link-and-pin coupler shanks stand service, they have had to reduce the thickness to about 5-16 of an inch with ribs inside. They were led to this by an examination of statistics of service which showed that the thinner heads and shanks broke less than the thicker ones. The Dowling coupler can be built with a minimum of thickness, as there are no parts of the design which require great thickness. The trunnions are so large in diameter that they can be made thin. This design has a maximum thickness of  $\frac{1}{4}$  in. and a minimum of  $\frac{3}{16}$  in. No part of this coupler is over  $\frac{1}{4}$  in. in thickness, and most of it is  $\frac{3}{16}$  in. We have seen heads of this sort made of  $\frac{3}{4}$  in. malleable iron placed under a steam hammer and driven together,  $\frac{1}{8}$  inch without fracture, by striking them on the top, the underneath side being on an anvil. This would be impossible if the material was much thicker. Owing to the light weight of this coupler it can be built at a low cost, and it is the intention of the manufacturers to put it on the market and guarantee it in every way as much as any coupler is

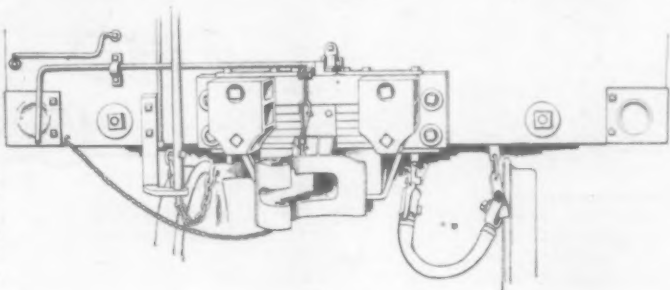


Fig. 5.

guaranteed, and sell it at a price that will enable them to compete with other couplers, some of which are sold at less than \$20. One of the advantages of a light coupler is that it can be more readily handled in repairing cars, and this is one of the claims which are made for this coupler.

The committee on pressed steel and malleable iron in their report to the last Master Car Builders' Convention called attention to the inferiority of malleable iron when made as thick as it is made for some car couplers, but it was not shown that a thin malleable iron coupler cannot be made sufficiently strong when the metal is properly distributed. The relative values of thick and thin malleable iron are not exactly known, but some tests are in progress which will be reported to the next convention that will give this information exactly.

Fig. 5 shows a new departure on the New York Central for all vertical plane couplers. It is an opening device consisting of a chain attached to the underside of the knuckle at one end and to the car at the other. It is intended to comply with the law requiring an "automatic" coupler, which is construed to mean a coupler that does not require the trainmen to go between the cars for any reason. There are now several devices for automatic couplers in this sense. One has a knuckle which opens by sliding down an inclined plane by gravity; a second contemplates a spring in the head which throws the knuckle open when unlocked; with the one here shown the knuckle is opened by a chain, and another type, of which there are several varieties, has the knuckle opened by moving to and fro the uncoupling rod.

In conclusion, regarding the new form of the Dowling here shown, it has been proved to be a strong and durable coupler so far as the four years' test on the West Shore of a few cars and pulling and dropping tests can show it. A considerable number have been made, and they are to be placed on the New York Central road.

#### Ten-Wheel Compound Locomotive for the Master Mechanics' Association Committee.

In the *Railroad Gazette*, Nov. 20, appeared some of the dimensions of a compound 10-wheeler to be built by the Baldwin Locomotive Works for the Master Mechanics' Association Committee on Compound Locomotives. This engine is finished and mention was made of its performance on the B. & O. in our columns last week. The following is a list of the dimensions, etc. The tests of



this locomotive are expected to be the most complete that have ever been made; therefore, these further particulars will be of interest.

Weight of engine in working order, 133,000 lbs.  
Weight on driving wheels, 103,000 lbs.  
Cylinders: high pressure, 14 x 24; low pressure, 24 x 24.  
Driving wheels: 72 in. diameter, 66 in. centres.  
Total wheel base, 24 ft. 2 in.; driving wheel-base, 12 ft. 6 in.  
Straight-top boiler 62 in. diameter at smokebox end, with 270 2-in. tubes, 14 ft. long.  
Firebox 120 in. long, by 34 in. wide.  
Working pressure, 185 lbs.  
Grates, rocking, with drop.  
Limit of height, 15 ft.  
Driving axle journals, 8 x 8½ in.  
Truck wheels, 33¼ in. diameter, with wrought iron spoke centres, and steel tires held by retaining rings.  
Engine truck journals, 5 x 10 in.  
Tender, 3,000 gallons capacity, fitted with water scoop.  
Tender wheels 36 in. diameter, of cast iron.  
Tender journal axles, 4 x 8 in.

and says that Donohue's eyes have been tested for color blindness, but he does not deny the story about the fixed signal.

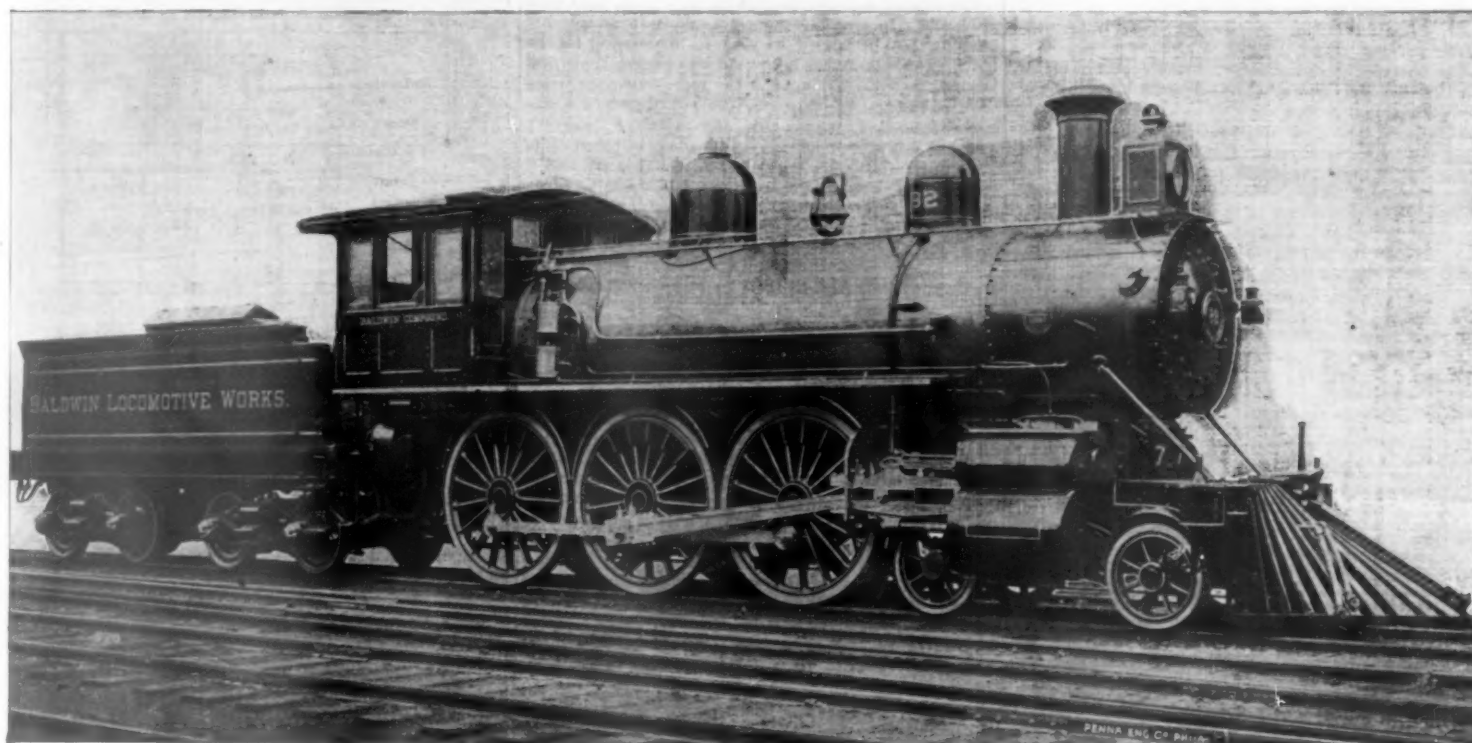
In reply to an inquiry from the State Railroad Commissioners the President of the New York Central has sent the following letter:

In September, after consultation with the Third Vice-President, I directed the Sykes system of signals to be extended from Spuyten Duyvil to Yonkers. In October, the Executive Committee at their meeting confirmed this order and authorized the extension of the signal from Yonkers to Oscawana. In December, and before the accident, the committee further directed that the system should be extended from Peekskill to Poughkeepsie.

Contracts have been let to the Johnson Railroad Signal Co. for the Sykes signal system from Yonkers to Oscawana, the blocks being on an average 1½ miles apart. From Oscawana to Peekskill we are using and testing the Hall signal system, the blocks being 3,000 ft. apart. Contracts have been let to the Johnson company for equipping the road from Peekskill to Poughkeepsie with the Sykes system, the blocks averaging 2½ miles apart. We are taking bids for equipping the road

connected with the upper stories of the towers so that one man can attend both to the block signals and the crossing gate where the number of trains is not too great. Ordinary semaphore signals are used, and a special wire has been put up, with electric bells, on which the signalling is to be done by a code of bell taps similar to that used with the Sykes system. Morse telegraph operators will therefore not be required. When it is necessary to give a permissive signal the signalman is to leave the semaphore at danger and exhibit a green hand signal.

The time interval system in use on the Long Island road is very carefully administered, rule 87, which takes the place of 87, 88 and 89 of the standard code, requiring every agent to display a red signal immediately after the passage of a train and to keep it in position for three minutes on busy sections of the road and five minutes on less crowded sections. After the expiration of this time a green signal is displayed for five minutes. This rule is also carried out by every flagman, bridge tender



TEN-WHEEL COMPOUND LOCOMOTIVE.

Built by the Baldwin Locomotive Works for the Master Mechanics' Association Committee.

Feed water supplied by two Sellers' 1887 No. 9½ injectors.  
Westinghouse automatic brake on all driving and tender wheels, and Westinghouse train signals.  
United States metallic packing for piston rods and valve stems.  
Nathan sight feed lubricator.  
Side rods with solid ends and bronze bushings.  
Cab with ventilator in roof.  
Headlight with side numbers.  
Steam heating connections, Pennsylvania Railroad standard.

#### The Hastings Collision.

The coroner's jury that held the inquest on this accident returned the following verdict on Dec. 30: "We find Brakeman Albert Herrick guilty of manslaughter in the second degree for the deaths of Thomas W. Polley and others, and we also find Augustus Ossman, Train Dispatcher at the Grand Central Depot, accessory thereto. We censure the railroad company for employing utterly incompetent men to discharge the duties of responsible positions. We also censure Station Agent Charles De Lanoy for not finding out the cause of Brakeman Herrick's appearance at his station with his danger signal. We recommend that the company adopt some system by which the lives of passengers may be made more secure."

John J. Bagnall, of Poughkeepsie, one of the injured in the wreck, has died since our last issue, making 13 deaths in all. Herrick surrendered himself Jan. 2, and he and Ossman were bound over to the Grand Jury, which meets next month. Herrick's counsel claims that witnesses will prove that torpedoes were exploded by the St. Louis express, which Herrick failed to flag, and that his red lantern stood where the engineer could see it; though a witness at the inquest said that the light was concealed from the engineer's view by the pillar of a platform scale. The lawyer also says that the engineer, Donohue, is the same one who ran past a red fixed signal and into the rear of a freight train near the same place a few weeks previously, and that he is color blind. An officer of the road has replied to these statements,

from Poughkeepsie to Albany with the Sykes system, the specification calling for 40 blocks in a distance of 60 miles. We expect the work to be completed as far as Peekskill within six weeks, the work between Albany and Peekskill to be completed as rapidly as the contractors can perform it.

We have decided to extend a block system from Albany to Buffalo. We have not yet determined what system it is best to put in between Albany and Buffalo. In this connection we are considering the merits of the Sykes, the Westinghouse pneumatic, the Hall and one which is in use on the Boston & Albany (clockwork). The Westinghouse pneumatic is in operation on the Harlem Division, between Woodlawn and Mott Haven, and doing good work, and has already been carefully examined by your board. Our officers believe that this system, used as an auxiliary with the Sykes block at stations only, would meet all the requirements between Buffalo and Albany.

We would be glad to receive in this connection any suggestions which your board will make.

The dividend declared by the New York Central directors within a few days after the disaster was at the rate of five per cent. per annum, one per cent. larger than the regular rate heretofore. This action of the directors has served in a marked degree to add acerbity to every newspaper comment that we have seen.

#### Block Signalling on the Long Island Railroad.

The Long Island Railroad has established the block system on about 10 miles of its double track line between Long Island City and Jamaica, 11 signal stations having been put in operation on Jan. 3. At most of these stations new towers, specially erected for this system, have been built and the company had intended to begin using them Jan. 15, but hurried up a little after hearing of the collision on the New York Central. The block stations are less than a mile apart and at four of them there are already interlocking machines for switches.

This is a busy section of the road, the trains of several divisions being concentrated here to reach the terminus, and there are numerous highway crossings attended by watchmen. It is said that few, if any, additional men will be needed, as the crossing gates have been con-

or other suitable employé stationed along the track. Sand glasses are used to measure the respective intervals, three minute, five minute and ten minute glasses being provided, the different glasses being distinguished by distinctive colors.

#### New Pintsch Gas Plants in the West.

Two plants for generating and compressing gas for the Pintsch lighting system, of about twenty thousand cubic feet capacity each, are soon to be erected. One of these is at Council Bluffs near the transfer station, from which pipe lines may be run to the half dozen railroad lines centring there. This plant can also be utilized by the Union Pacific, as a large proportion of its cars run regularly across from Omaha. The centralization here of so many yards makes this a particularly favorable place for a gas plant, the cost of the service for each road thus being reduced materially.

The other plant will be situated at Kansas City, at a point either under the bluffs or farther down by the city gas works near the tracks of the Memphis route, and pipe lines laid up through the yards to and beyond the station, and reaching the house tracks of all the roads entering the Union Depot. A line may also be run to the other station and yards giving a supply to the St. Paul road.

The Pintsch gas plant put in a short time ago in Chicago has been increased to double the capacity. The original structure was placed at Sixteenth and Clark streets, but after getting started there developed considerable trouble with the city authorities on account of the tar and other refuse incident to a gas plant. Arrangements have been made with the Equitable Gas Co., which enables the Pintsch company to construct a plant on the gas company's grounds at Twenty-sixth street and the river. All the machinery has been moved up to the new location, and a 1½-inch pipe line laid connecting the two plants. From Sixteenth street station branch lines of ½-inch pipe are run to the yards at the Northern

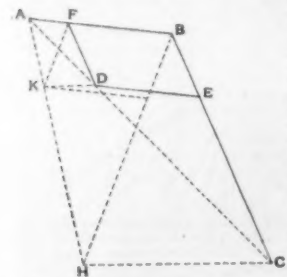
Pacific, Rock Island and Dearborn stations, and to the Illinois Central yards at Weldon station. These lines are laid in trenches from 30 to 36 in. below the surface of the ground. In carrying the line over to Weldon the pipe was laid along the right of way of "the St. Charles Air Line" about 36 in. below grade, except where crossing the two double lines of cable tracks, where it was necessary to dip down to about 8 ft., and a 2½-in. pipe with a pointed tip was driven through the soil the entire distance under the tracks.

The supply of gas to the Alton is at present by means of a transport car having two storage tanks of about 4,000 cu. ft. capacity each, thus giving an ample amount of gas on hand from which to draw when needed. This transfer car is hauled back and forth by the Alton road, as their line runs alongside the generating station. The generating plant now in operation has four benches, of which only three have so far been used. Each of these has a capacity of between six and seven hundred cubic feet per hour, which with a run of about eighteen hours per day gives a maximum of about 50,000 cu. ft. This and the plant on the Northwestern road are similar in size and details. A description of the latter was given in the *Railroad Gazette* of July 24, 1891.

#### Elliott's Indicator Rigging.

The indicator rigging illustrated was designed by Mr. W. H. Elliott, of the mechanical department of the Chicago, Milwaukee & St. Paul, and is now being used on that railroad with great success. It is made on the principle of a pantograph using one rectangle, the motion being taken from the angle intersected by the line drawn between the two extended sides of the rectangle. The geometrical principle is, that in any jointed parallelogram having two adjacent sides extended until a line drawn from the extremities passes through the point of intersection of the other two sides, these points will always remain in the same straight line; that if one point be fixed and one of the others moved the third will be moved in direct proportion.

Let  $F B E D$  be a parallelogram with sides extended to  $A$  and  $C$ . Draw the line  $A C$  passing through the point of intersection of the other two sides at  $D$ . Then in whatever position the mechanism is placed, these three points will always lie in the same straight line. For by the similarity of triangles, we have  $D E : E C :: A B : B C$  so that  $D E = A B \times \frac{E C}{B C}$  and  $D$  must therefore



always occupy the same position on the line  $D E$ . Also we have  $A C : B C :: A D : B E$  and  $A D$  is therefore proportional to  $A C$  for all positions of the mechanism. From this it follows that if  $D$  is made to trace any line,  $C$  will describe a similar one on a larger scale. Conversely if  $C$  trace a line  $B$  will trace a similar one parallel to it and directly proportional.

To construct this rigging, lay off on a straight line the length of card wanted as  $K D$ . Draw parallel to this a line equal to the length of stroke,  $H C$ , and at a distance from it equal to the height of the indicator above the crosshead. Draw the lines  $H K$  and  $C D$  intersecting at  $A$  for the point of suspension. Having this point it only remains to construct the rectangle, which may be done as follows: With the points  $H$  and  $C$  as centres and a radius, equal to the vertical distance of the point of suspension above  $H C + \frac{1}{2}$  the versed sine of an arc with this distance as a radius and a chord equal to the length of stroke, draw arcs intersecting at  $B$ . Draw lines  $A B$  and  $B C$  and from  $D$  draw  $D F$  parallel to  $B C$  and  $D E$  parallel to  $A B$  and the rectangle is completed.

The rigging as constructed is very clearly shown in the cut from a photograph. The upright has a shoulder resting on the guide and is clamped at the top and has a T-head bolt engaging the guide bolts underneath. A brace of 1½ in. x ¼ in. iron bolted to the running board prevents lateral motion but transmits no vibration the latter may have. A guide bolted to the running board has been found necessary to prevent excessive vibration at high speeds, and stands ¼ in. away from the rigging. Two guides are used for the rod from which the motion is taken, to prevent any lateral motion which might be imparted to it from the rigging, and at the same time to take a part of the strain from the bolts. These guides are made adjustable vertically, as in raising or lowering the motion rod for different heights of steam chests, the distance changes from the point of suspension to this point in proportion as the point of suspension is moved

to or from the line of stroke. In practice this is found to be about ½ in.

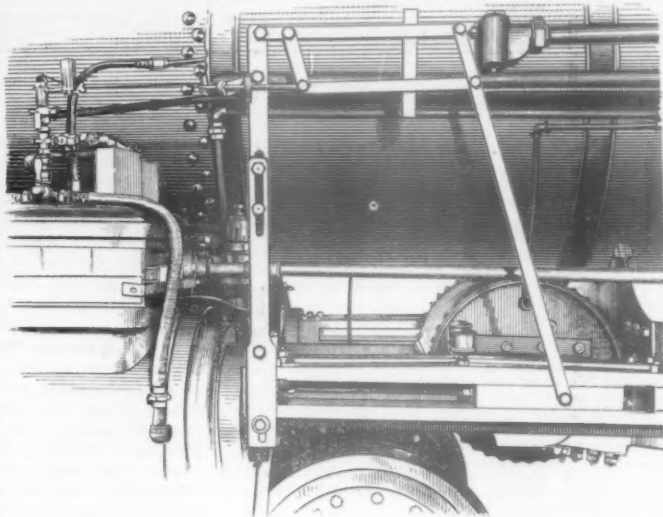
Attached to the outer guide is a small pulley, placed so that a chord passing around it would be central over the motion rod. To attach the indicator a wire loop is used, about one inch longer than the travel of motion rod, with a string running from one end to the indicator, and one from the other, about a yard long, around the pulley, and hooking by means of a ring over some convenient fastening. A spring is used between chord and ring to take up what the former may stretch. The chord to the indicator must, of course, be of such length as to transmit the right motion to the drum, and also allow the pin in the end of the motion rod to move in the wire loop perfectly free, when it is desired not to turn the drum.

Having everything adjusted, to take the card is very easy. When the string is unhooked the wire loop engages the motion pin, the drum turns, the card is taken, and then the string is once more hooked up. There is no trouble about not having held the chord properly, or its being longer or shorter, or with hooking the chord on the motion pin, when running at high speed.

The rigging is constructed of 1½ in. x ¼ in. steel with ½ in. and ¾ in. steel bolts, but it would be much better if bushings had been used to give ½ in. bearing for the bolts. The rigging has been used six or seven times and beyond the bolts moving a little more freely there has been no wear. As shown in the cut there is a steam chest connection which makes the indicator pipes very long but a new cock is being made which will lower this materially. The pipes have to be well braced and a strong spring used on the drum to prevent getting cards of different length, at high speeds. The rigging has been run as high as 350 revolutions per minute and given cards of the same length as at slower speeds.

#### Connecticut Railroad Commissioners' Report.

The Commissioners, Messrs. George M. Woodruff, William H. Hayward and William O. Seymour, have issued the thirty ninth annual report of the board, for the year ending June 30 last. No new road has been built during the year, the improvements on the New York, New Haven & Hartford being the principal work done in the state. The mileage of road is 1,006, of which 212 miles is double track. In discussing accidents the report reminds managers that they are responsible not only for establishing working hours of reasonable length, but also for seeing that the willingness of employees or their anxiety for extra compensation does not result in overwork even when it is nominally prohibited. The number of passengers killed during the year was three and the number of injured 56; employees, killed 34, injured 200; trespassers, killed 21, injured 50; other persons, killed 12, injured 15. No passengers were killed or injured except by their own fault. The number of persons in-



ELLIOTT'S INDICATOR RIGGING.

jured at highway crossings has dropped from 31 to 24. These injuries on the New York, New Haven & Hartford have been only 12, as against 22 in each of the two preceding years, a result which is believed to be due to the large number of highway bridges that have been built by this road.

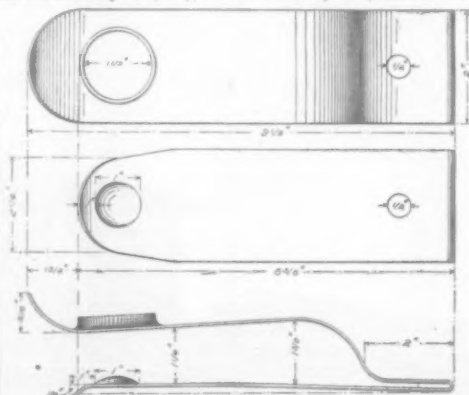
All the roads in the state, except two very small ones, have adopted some system of continuous heating for passenger cars. The Commissioners have thought it preferable to leave this matter to "the voluntary action of the companies under the pressure of public sentiment." The Commissioners recommend that they be authorized to have made a description of all the railroad bridges in the state, as has been done in New York and Massachusetts. The Union station at Norwich is in course of construction, but the project for one at Waterbury stands just where it did a year ago. Gates have been ordered at several crossings. The Sunday law is ignored by the New York & New England and the Housatonic roads, that day being used to clear up the freight yards. Persons complaining at violations of this

law have been referred to the State Treasurer, upon whom rests the duty of suing for the penalty. Considerable space is given to a discussion of the recent decision of the Virginia Court of Appeal in the case against the Norfolk & Western for running freight trains on Sunday, wherein it is held that the police power of the state must not be exercised so as to interfere with interstate commerce.

Reference is made to the conference of New England Railroad Commissioners lately held in Boston. At that meeting a resolution was passed recommending a compilation and comparison of the laws of all the New England States, and of New York, affecting steam railroads. The report has the usual statistical tables.

#### Dummy Coupling for Air Brake Hose.

The dummy air brake coupling which is illustrated is the invention of Mr. E. M. Roberts, Master of Machinery, South Carolina Railway. The three views which are given show the coupling very completely. It is attached to the car in the proper position by a wood screw through the ½-in. hole shown in the upper end. In this position it is ready to receive the brake coupling, which, as the dummy coupling is held rigidly in position, can



Dummy Coupling for Air Brake Hose.

be readily inserted with one hand. The cap on the back of the air brake coupling enters the 1½ in. hole shown on the upper plate, while the opening of the gasket is engaged by the boss stamped up on the lower plate. The coupling is made of tempered steel, and the air brake coupling is held in position by the spring of the dummy.

It has this manifest advantage, that the brake coupling cannot be hung up in any way other than the one in which it is closed against the introduction of dirt or dust. Mr. Roberts says that his experience, particularly with freight cars, has shown the necessity for something better than the dummy coupling now generally used, which is so inconvenient that the trainmen either do not hang up the brake hose or hang it on the hook of the dummy so as to allow the hook to come in contact with the gasket and also to allow dust and dirt to enter. Certainly any device that will help to do away with the constant neglect of the precaution of hanging up the brake coupling will commend itself. Mr. Roberts' coupling will be manufactured by the Morris Box Lid Co., of Pittsburgh, Pa.

#### England's Postal Telegraphs.

A recent number of the *Engineer* (London) contains a very complete account of the postal telegraph system of Great Britain and Ireland carried on by the postoffice department. The article gives careful detail of the telegraphic instruments employed, from the simple sounder to the complex arrangements of the duplex, quadruplex and multiplex systems, by which the capacity of the wires is so greatly increased. These instruments are practically the same, and accomplish the same results as those used in this country.

The peculiar feature of the English work which is of especial interest, and which it seems strange has not been duplicated to a greater extent in this country, is the use of pneumatic tubes for the transmission of messages. It may be said that the whole of the local business of London is carried on through these tubes.

The first central telegraph station in the world was erected in 1849-50 by the Electric Telegraph Co. in Lothbury. In 1860 a larger and more commodious building was erected in Telegraph street, but in 1873 the station was removed to the general postoffice (West), in St. Martin's le Grand, where it now flourishes as the largest telegraph station in the world, doing 50 per cent. of the telegraphic business of the United Kingdom, and sometimes dispatching more than a million words a day.

The first pneumatic tube was laid in 1853, connecting the central office with the Stock Exchange, and a small engine of 6 H. P., fitted with a vacuum pump, was placed in the basement of the central office. An electric signaling system was established, and messages inclosed in small pouches were pumped into the central station and then sent out by wire to their destination. From this small beginning the system has been increased, since the acquisition of the telegraphs by the government in 1870, until now the whole of London is



served and there is an aggregate of  $3\frac{1}{2}$  miles of single tube; the busier offices having two tubes each, one for "up" and one for "down" traffic.

The engines, boilers and pumps are in a large building contrived by roofing over with glass and iron one of the central courts of the main structure. The boilers are of the Cornish multitubular type, 6 ft. 6 in. diameter, and 20 ft. 2 in. long. There are two 15 H. P. beam engines, each driving two sets of three throw pumps delivering water into stand-pipes, whence it is drawn for the high service cold water supply and for heating.

There are also four compound beam engines of the Wolff type with high pressure cylinders 17 in. diameter, and 4 ft.  $1\frac{1}{2}$  in. stroke, and low pressure cylinders 25 $\frac{1}{2}$  in. diameter and 5 ft. 6 in. stroke. Each of these engines works two exhausting and compressing pumps 35 in. diameter and 3 ft. stroke, which are so arranged that they can be made either to draw from an 18-in. vacuum main or to force into two 15 in. pressure mains, which afterward unite to form one 18-in. main. The valves of these pumps are of leather, with suitable iron backing and beat upon gun metal seats. Steam is supplied to the high pressure cylinders at 70 lbs. per sq. in. One of the peculiarities of the engine is the governor, which is of the Porter type. These governors operate on a throttle valve and the arrangement for regulating the velocity of the engine is peculiar in that the engines are not controlled by the governors alone but by a secondary regulator in connection with the air main. The engine might be speeded properly by the governor, and from some cause pressure in the main might increase, the load would augment and the governors would give more steam. But as this is just what they should not do, a little piston and cylinder is fitted below each governor, and when the pressure tends to rise in the mains these pistons act so as to tend to close the throttle valves. So that if the speed increases or the pressure rises above the normal either governor is free to act upon the throttle and close it.

The tubes are of two sizes, the larger 3 in. internal diameter and the smaller 2 $\frac{1}{2}$  in. They are of lead and are made smooth and straight by drawing a tight fitting steel mandrel lubricated with soft soap through them. The ends are cut flat and prepared in the usual way for a plumber's joint, while to protect them from mechanical or other injury they are encased in cast iron pipe, so coupled that every joint is readily accessible for repairs. Where curves are required the lead tubes are bent and laid in split cast iron sections.

At the out stations each tube terminates in a wooden box with a glazed hanging door swinging inward. A waste pipe for expanding air is connected with the box. Then when pressure is applied the door is held closed, while when air is being exhausted from the tube by the engines of the central station the door swings open to admit the supply—for the tubes can be worked either under pressure to carry messages from the central office or with suction to carry them to the central office.

The arrangement of valves is such that carriers can be inserted in a tube without loss of pressure or interference with the speed of the preceding carrier, or a carrier may be stopped at an intermediate station, removed from the tube, additional messages inserted, replaced and allowed to proceed, all without any loss of vacuum or pressure.

The carriers are made of gutta percha tubing covered with felt, and closed at one end by discs of felt stitched together to form a buffer.

The block signalling system is also rigidly enforced. No carrier is allowed to be inserted in the tube until the preceding carrier has reached its destination. Exception is made in the case of long runs, where there are intermediate automatic block signals. When a carrier is inserted in the tube, a pointer on a signal swings to the mark, "carrier in tube," as it leaves the tube it drops upon a light framework depressing the same, and making an electrical connection which swings the pointer back to the mark, "tube clear." On long runs the carrier automatically signals back its position as it passes a block, so that there may be several carriers moving in the same direction, but separated by suitable distances.

In this way all of the dispatches that are received in London are sent out to the local offices for distribution, and all these latter send their messages into the central station for transmission by wire. In short, all of the telegraphing is done by the central office. As the speed of the carriers is from 20 to 30 miles per hour, there is no loss of time. For example, suppose the system were in use in New York, and a message were received at 195 Broadway for a 125th street delivery. The distance is about eight miles. The transmission by carrier would occupy from 12 to 15 minutes and would be made without delay, whereas the transmission by wire would involve calling, getting the wire and probably take fully as long. The pneumatic tubes are also extended all over the central office building, so that there are no messengers running to and fro, but merely an array of sorting tables and the valves of the tubes at which and between which the employees are at work.

Space forbids any description of the wire work, and we can only say that the wires are laid in cables underneath the sidewalks and are so arranged that any wire in any cable can be repaired or replaced without disturbing the pavement. These cables are laid in wrought iron pipe of convenient sectional length into which new cables can be drawn to replace the old without the

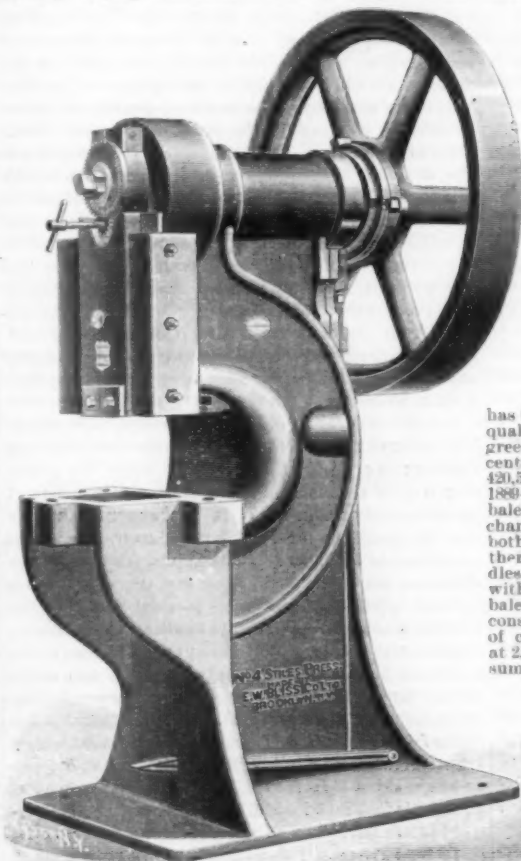
slightest interruption to the work passing through the wires at the time.

Nothing succeeds like success. So the Telegraph Department has ample funds, more than pays expenses and is rarely interfered with by parliamentary enactments. The rates are one shilling for 20 words or six pence for 12 words, less than half the rates in this country. The average number of messages passing through the central office in London is about 110,000 a day.

#### The Stiles Power Punching Press.

We illustrate herewith a No. 4 Stiles punching press as manufactured by the E. W. Bliss Co., of Brooklyn, N. Y. It is a number of specially valuable features, a few of which may be stated as follows:

It has a frame design combining strength and rigidity with easy convenience and access for handling and placing the dies and material, as well as for seeing them while at work. It has a steel pitman, resting with its lower end upon a solid seat working in the slide. The crank pin operates in renewable gun metal bushings. An eccentric adjustment of the Stiles pattern is provided, permitting of rapid, accurate and reliable adjustment to suit any varying thickness of dies. It has a Stiles



STILES NO. 4 PUNCHING PRESS.

automatic clutch which permits of the turning of the shaft for setting the dies while the wheel is in motion without risk to the operator, also the starting up of the press at one-third revolution of the wheel. A "T" slot is provided at the throat of the frame, to which strips, gauges and other necessary fixtures may be fastened as desired. The shaft is of forged steel and of sufficient size to provide against springing. A fly-wheel is provided of large diameter and of ample width for extreme belt power. A positive stop is provided to insure against a second stroke in case the foot is not removed from the treadle. This stop, however, may be released and a regular clutch action had when desired.

These presses are now in use in very many of the leading manufacturing establishments where such tools are necessary or useful. The range of work provided for, covers almost every kind of blank cutting, punching, perforating, forming and bending, including a large proportion of the operations needed in the manufacture of hardware, locks, cutlery, guns, sewing machines, typewriters, and many other articles made out of sheet metal. The presses are made in 7 sizes, each of which can be furnished as a fly-wheel or geared press. The weight ranges from 500 to 12,000 lbs.

#### Our Coal Trade.

The *Coal Trade Journal* calls attention to the production of coal which has reached 140,000,000 net tons, or over two tons per capita.

The production of coal in this country by census years has been as below, in gross tons:

	Anthracite.	Bituminous.	Total.
1850.....	2,989,017	3,406,206	6,455,223
1860.....	8,391,267	5,156,319	13,547,586
1870.....	13,985,969	15,348,585	29,334,554
1880.....	25,580,240	38,173,114	63,753,354
1890.....	40,685,192	81,370,538	122,055,730

The three great coal producing countries of the world

are, in the order named, Great Britain, the United States and Germany. Their production and the increase in each country is given below:

	Coal Production 1870 and 1890 (1 = 1,000).	
	1870.	1890.
Great Britain.....	109,035	181,614
United States.....	29,535	125,035
Germany.....	35,397	70,030
Total.....	173,967	376,679

Although England has relinquished to us the supremacy in pig iron production, she still leads us in the production of coal by over 56 million tons. In this she now occupies the relative position held by her in 1885 and '86 in the production of pig iron. In 1890 her coal production was 59.3 per cent. of the total in the two countries, and in 1870 it was 78.8 per cent.

The area of our coal fields is estimated as 192,000 sq. miles, of which it is thought 120,000 sq. miles could be profitably worked at present if there was demand and transportation enough. West Virginia alone has more coal than Great Britain, though only 7,281,439 gross tons were dug there last year.

#### The Progress of the South.

The increase in the assessed value of property in the South for 1891 was \$320,000,000. According to the *Manufacturers' Record*, this makes the assessed value \$4,816,306,916 as against \$2,913,436,065 in 1890. The increase for 1890, which is larger than for any previous year, is extremely gratifying in view of the positive depression in Europe and the general financial stringency in this country, but in spite of this the South has completed 28 blast furnaces, 10 rolling mills, 2 Bessemer steel plants, besides having nearly finished two cotton tie mills. The *Manufacturers' Record* gives the production of pig iron for the last half of this year as 1,004,806 gross tons, a gain of about 12 per cent. on the production of the same period last year. The production for the whole year, however, was 1,707,177 gross tons, against 1,744,100 tons in 1890. The production of coal is estimated at 23,070,000 gross tons, which is compared with 15,840,454 gross tons for 1890, as returned in the census. All of the great staple crops—cotton, corn, wheat, sugar and tobacco—have yielded in abundance on an increased area, and the growing disposition to diversify crops and to go into truck farming has been stimulated. The yield of corn has increased by 26 per cent., and that of wheat by 37 per cent. There has been a large increase in the yield of cane sugar, which

has been accompanied by marked improvement in its quality, as under the law, the sugar must test 90 degrees by the polariscope to receive the bounty of two cents per pound. This season's crop is estimated at 430,560,000 pounds, as against 385,706,271 pounds in 1890-91. The cotton crop for the season reaches 8,652,547 bales by the estimate of the New Orleans Cotton Exchange. This large crop has resulted in decreased prices, both for raw cotton and for cotton cloth. Nevertheless, there is a marked increase in the number of mills, spindles and looms in the South, and during the year ending with Aug. 31, 1891, the southern mills consumed 604,061 bales of cotton, an advance of 10.58 per cent. over the consumption of the preceding year. The consumption of cotton by the northern mills in 1890-91 is put down at 2,027,362 bales, again of 12.67 per cent. over the consumption of the preceding season. The total consumption of cotton, however, in the mills of this country is only about one third of our crop.

#### A New Street Car.

The Brownell Car Company has made a new design of street car, which is being tried on the North Chicago cable road. It has side seats the same as the ordinary car, but the seats are removed for about two feet at each end on each side. There are double doors at both ends.

The advantages are many, and the arrangement will be attractive to the street car companies. The platforms are at least two feet longer, and can hold about twenty persons each. The ease of entrance and exit is remarkable. The passenger in stepping on the platform reaches the door at once without crowding through the passengers on the platforms, the door being placed at the side, almost over the step. The conductor has a full view of the entrance and interior of the car through the door, and at the same time can lean outside of the car and better assist passengers in getting on and off. This car has four wheels and, having a long overhanging platform, is objectionable in passing around curves, and there is therefore a noticeable increase in the irregularity of motion. The same car, however, with two four wheel trucks, such as are now common for the best street car equipment, would be a decided improvement over the ordinary type. The double doors offer no inconvenience, as the one on the side toward the track on which the cars are running in the opposite direction is always kept closed.

#### Car Heating.

The Consolidated Car-Heating Co. states that in the four months ending Jan. 1, 1892, the company has furnished to railroads 13,459 steam couplers, 459 complete car equipments and 162 locomotive equipments. The Old Colony Railroad has had 10 equipments, the Boston & Maine, 175; the Canadian Pacific, 45; the Concord & Montreal, 64, and the Wagner Palace Car Co., an average of 10 equipments a month. The Canada Atlantic, the "Soo Line," and all the Vanderbilt lines are also large dealers with the Consolidated Co., which reports having on Jan. 1 orders yet to be filled for 130 complete car equipments. By permission, the Consolidated Co. also announces that the Wagner Palace Car Co. has adopted the improved Commingler (McElroy) system as well as the Sewall Coupler.



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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Professor Woods, on another page, calls attention to a point which we have endeavored to emphasize in the past. This matter of relative cylinder capacities is a very important one, and while, as our correspondent states, we may not expect absolute uniformity, there is no good reason for the wide divergence which now exists in the same class of service. Each condition requires, perhaps, a different cylinder volume in proportion to the work to be done; and in general the heavier the work which a given weight of engine has to do, the greater should be the cylinder volume. We have shown how unsatisfactory are the results of using a hard and fast rule for the proportions of the capacities of the cylinders, the weight on drivers, and the diameter of the wheels. Heavy freight service furnishes entirely different conditions of operation from heavy express service, and therefore a different cylinder capacity is necessary for the same weight of engine. For further discussion of this matter in detail, see the *Railroad Gazette*, July 24 and Oct. 2, 1891.

The President has sent to the Senate the following nominations for Interstate Commerce Commissioners: William R. Morrison, reappointed; James W. McDill, of Iowa, to succeed Judge Cooley, resigned, and William M. Lindsey, of Kentucky, to succeed General Bragg, deceased. Colonel Morrison is the only member of the original Commission remaining in service. This Commission, it will be remembered, consisted of Messrs. Cooley, Morrison, Schoonmaker, Walker and Bragg. The strength of the Commission consisted not only in the native ability, the legal learning and the varied experience of its members, but in the fact that most of them, perhaps all, were inclined from the start to take a very conservative and temperate view of their duties and powers and to interpret the law with a due recognition of the vast interests at stake. So while they were in a position where they might have done great harm, they actually did little harm and accomplished much good. Not the least good that they accomplished was in that their influence will undoubtedly be felt in the Commission for a good while, whatever its composition; and it must be apparent to every sagacious observer that the power and influence of the Commission will be measured very strictly by the fidelity with which it carries out the policy which governed the original Commission in its first and most trying years.

#### The Financial Outlook.

The year 1891 has been marked by two salient facts, a large wheat crop and a small railroad construction. The wheat production has been much greater than ever before; the percentage of increase of railroad mileage has been about as small as that of any year since the resumption of specie payments, and, with the exception of the time of the war, the smallest but two in the whole railroad history of the country. The

effect of one of these things is temporary, of the other permanent. In considering the possibilities for the future, it is important to distinguish closely between the action of these two causes.

That there has been a decided rise in the value of railroad securities is a plain fact to every one who has followed stock quotations. This rise was perhaps not so sudden as that of 1886 or 1879, but it was equally unexpected. It is the fashion to attribute it mainly to the effect of the large wheat crop. So able an authority as the *Financial Chronicle* explains it almost wholly on this ground. "Speaking broadly," says this journal, "the excellent crops of 1891 have been the moving force—the one great predominant factor—in effecting the improvement which has occurred." That no inconsiderable part of the change is due to this cause we are quite ready to admit; but we doubt whether the whole change, or nearly the whole, can be explained in this way. If this were the cause of the increased value we might expect a reaction next year, for the circumstances of 1891 were clearly exceptional. Not merely did we have a large wheat crop of our own, but there was also a small wheat crop in Europe. This short European crop caused an extra demand at remunerative prices. To secure the gain to the farmers the whole supply of transportation facilities was called into play. The means of getting the wheat to market, whether in the form of railroads, steamships or warehouses, were more or less inadequate to the demand. There was thus a combination which would hardly exist once in ten years—a combination approximately realized in 1881, but for whose full parallel we must go back as far as 1871—under which the country enjoyed the benefit both of large sales and of high rates, while the railroads were in a position to take no inconsiderable share of the returns thus obtained. If the cause for the increased price of railroad securities were to be sought in the wheat crop alone, there would be no reason to expect the improvement to be lasting.

In point of fact, we believe that more indirect causes have entered into the situation. In the first place, the rise in price of securities consequent upon the wheat crop is itself the result of a calculation rather than of profits already realized. It is not generally known that the dividends of 1891 have shown no advance over those of 1890, yet the indications, taken from the *Financial Chronicle* itself, show that there has been a decline rather than advance in this respect. The trunk lines show a very slight increase; the Southern roads, on the whole, a diminution; the Western roads a decided diminution. Central of Georgia has fallen from 8 per cent. to 7, and the stockholders are having some difficulty in getting that. Queen & Crescent has fallen from 6 to 4; East Tennessee, Virginia & Georgia 1st preferred, from 5 to 2. Chicago, Burlington & Quincy has paid but  $4\frac{1}{2}$  instead of 5; Rock Island 3 instead of 4; Illinois Central 5 instead of 6; Missouri Pacific 3 instead of 4. Dividends on St. Louis & San Francisco 1st preferred have ceased altogether. Any improvement in price of stocks is a result of anticipated dividends rather than of dividends actually realized; and it is fair to assume that those who make this kind of calculation for the future will take into consideration other causes than those which they know to be wholly transient. Such a permanent cause is to be found in the small railroad construction of the last three years. In 1889 we built 5,146 miles of railroad; in 1890, 5,498; in 1891, probably about 4,100. The total construction for the three years is certainly less than 15,000 miles. The absolute increase during this period was a little larger than in the three years 1883-1885: the percentage of increase was actually smaller. When railroad construction is thus reduced, the dangers arising from over supply of railroads are diminished and the probable financial position of the roads in the immediate future becomes far better on this ground alone.

But, it will be said, the low rates which are enforced, both by law and by business practice, will prevent the roads from realizing the benefit of this partial monopoly. They may be in a position to command large gross earnings but their net earnings will not be correspondingly improved. Let us look into the general business principles involved and see how far such a view is true.

If we take the statistics of the last 10 years, we find that there has been an almost steady reduction in rates. The receipts per ton mile on the railroads of the country fell gradually from 1.23 cents in 1882 to 0.93 in 1890; and, what is more significant, the greater part of this reduction occurred in the first half of the time in question. Yet the roads at the end of the first half of this period,—say during the latter part of 1886, were in a better financial position than at any other time. Why? Simply because the volume of possible traffic during the years 1884 and 1885 had been increased

ing faster than the transportation facilities. It is a mere truism to say that the profitability of a road depends quite as much upon the amount of business it can get as upon the ton miles a day; and that a road can reduce its rates to almost any extent, provided it can be sure of traffic enough to keep its track and its cars profitably employed. It could do this at the end of 1886; it could not do it at the end of 1888. Some 25,000 miles of railroad had been put into operation during the intervening period, and although the average charges had fallen but .06 of one cent in two years, the general rate of profit had fallen enormously. Three years more, with comparatively slight railroad building, has witnessed a great change. With the increase of population and the general development of business there is always room for additional railroad development. If this development moves faster than the average, as it did in 1887, it will put the railroads at the mercy of the public; if it moves slower than the average, as it has done in 1891, it tends to give the railroads a corresponding advantage. The large wheat crop, with the resulting scarcity of cars, brought this advantage more clearly before the public mind than would have been otherwise the case, and made the improvement in price of securities more prompt and more rapid. But we believe that it should be regarded as an incident rather than as a primary cause.

How far may we expect this improvement to be maintained? That depends largely upon the readiness to invest money in railroads in the year 1892. If investors are slow to take advantage of new conditions, as was the case in 1879, there is probability of permanent gain; if they rush in headlong, as they did in 1886 and 1887, the result can be but temporary. On the whole, the indications are that matters will take a course more like that of 1879 than like that of 1886. Both railroad managers and railroad investors, now as well as in 1879, have become pretty thoroughly frightened by legislation. The managers are taking care to divide less than they have earned. The investors are not in a hurry to be tempted by opportunities of building railroads where reckless legislation may deprive them of the possibility of returns. In 1886, when there had been no very radical legislation, people regarded the business depression as temporary, and were ready to treat it lightly. In 1891, they have just been through an experience of Granger legislation not unlike that of fifteen years before; and there is some indication that the permanent effect will be a good deal the same, making the rise of railroad values a little slower than would otherwise be the case, and the permanent gain larger.

The analogies between 1892 and 1879 extend into a variety of details. In each case there is a readiness to let hostile legislation stand in abeyance, so that many of the statutes may become a dead letter. Comparatively few of the Granger states, in 1886 or 1877, repealed the laws that stood on their statute books; but none of them enforced such laws to anything like the extent which had been expected. In like manner we find to-day no prospect of the repeal of the pooling clause of the Interstate Commerce Act, but we find a readiness to allow everybody to disregard it as far as may be convenient and useful. In 1887 the railroads said, we cannot pool our traffic, it is against the law. In 1888 they said, we wish that we could find some way of pooling our traffic which would not be against the law. In 1889 they said, we think we can form ways of pooling our traffic which will evade the law, but we must not say anything about them. In 1890 they began to talk of them cautiously. In 1891 they spoke of them quite freely. The statute remains the same but people cease to fear it. So of the jurisdiction of national and state commissioners over rates: the authority remains the same, but public sentiment no longer encourages the exercise of that authority to the same extent that it did four years ago. The lack of sufficient railroad facilities has made people much more cautious than when there was an over supply of such facilities, and it seems likely that this caution will continue until we shall have had a year or two of reckless railroad building. It will depend upon managers and investors to say how long we are to wait for this reaction.

To sum up, then, we believe that the cause of improvement in railroad values is to be sought quite as much in the limited construction as in the exceptional wheat crop; and that, as long as this cautiousness about new construction continues, the improvement has in it the elements of permanence. We also believe that the present year is much more like 1879 than like 1886 in its financial conditions, and that instead of a sudden increase in railroad values and an equally sudden reaction, we may hope to see a slower, and at the same time sounder, development of better times.



### How Long Does it Take to Establish the Block System?

The criticism of the New York Central for its dilatory course in adopting the block system has led to considerable talk about the length of time necessary to put such a system into effect. The Long Island road, which was preparing to introduce the ordinary manual block system on the 10 miles between Long Island City and Jamaica, announced within a day or two after the Hastings collision that its fixtures, already in course of construction, would be put in use at once (Jan. 3) instead of later, as had been intended; and this leads to the inquiry we have suggested.

The adoption of an improvement on the spur of the moment, because an indignant public is temporarily excited, cannot be regarded as evidence of the highest wisdom, for a railroad manager is bound to take all proper measures for the safety of passengers without waiting for the clamor that follows an appalling accident; but without stopping now to analyze the motive, let us ask what can be done by a superintendent who unexpectedly receives authority to change from the time interval to the space interval system. As railroad presidents, like other people, sometimes change their minds, it is well enough for the manager or superintendent who has long desired to make the improvement, to be ready to stir at once on receipt of the necessary authority. The Long Island road had been preparing for some time and so was ready to respond to the public demand at once; but how about roads which are equally well disposed to respond but have not begun the preparations? If a manager consults his passenger department he will be reminded that the introduction of the block system now will be a much more effective advertisement than it will be if postponed to a more quiet time.

To answer this question it is only necessary to refer to what has already been done by a number of single track roads, as heretofore told in the *Railroad Gazette*. The arrangements made on the Wabash in 1888 as described in our issue of Feb. 8, 1889, were made with practically no expenditure of money at all, except the additional salaries, which implies that no change in signals, wires or telegraph instruments was necessary. On the Canada division of the Michigan Central passenger trains are effectively blocked against rear collisions with no special apparatus whatever. The Canadian Pacific blocks passenger trains on 1,600 miles of road. The Lake Shore & Michigan Southern has blocked passenger trains against rear collisions for 15 years with no special apparatus. These and other instances show conclusively that the establishment of an absolute interval of space between trains is not primarily a question of special apparatus, and it is equally clear that it is not a question of important changes in the printed regulations for running trains. Any road that has a decent equipment of telegraph offices and train order signals can begin blocking at once, the only essential question being the ability of its telegraph operators to comprehend a very simple code of rules. A circular giving the necessary instructions would be no more complicated or difficult than are dozens of circulars which are issued every year with no special allowance of time for studying them. We are not sure but the immediate establishment of the block system is incumbent as a duty on some companies which have not a train-order signal on the road, and which would therefore have to rely on the use of a flag or lantern, manipulated by the operator—hand signaling of that kind is far safer than flagging by the brakeman—but we will not just now consider roads so wedded to primitive practices as that.

The only troublesome question is that of delays to trains in consequence of the long distances between stations; but that may in some cases be less troublesome than a constant bombardment from the daily newspapers; and we have ignored it in the preceding paragraph because on most roads it can be more or less readily put off, for a short time at least. An additional telegraph wire will be found necessary for smooth working in most cases, but the money and the time needed for this are both comparatively small.

Inasmuch as a feeling of uncertainty regarding the complications liable to arise from this delay to trains is in many cases the chief reason for postponing consideration of the block system, it would seem that a principal duty of a manager thus hampered would be, when his directors are unusually alive to the subject, to begin blocking as soon as possible, with the telegraph offices already available, provided he can do so without completely blocking the freight yards, and then to take up the question of delays afterward as it becomes necessary. In other words, reverse the conditions and try, for a while, the experiment of letting convenience wait on safety instead of safety waiting so much on convenience. Under present customs the convenience of

the yardmaster, the avoidance of delays to freight trains on the road, and other like considerations are held to justify the continuance of the old system; but if the safety to be had from the use of the space-interval system were at the outset laid down as an essential, and the disturbance of conveniences thus caused were vigorously dealt with, each feature as it came up, a workable adjustment of the conflicting interests would often be found far easier of accomplishment than had been expected.

The Erie road has during the past year begun block signaling on several divisions with very little fuss and with practically no expense but the wages of the additional operators. If safety alone had been aimed at, and convenience sacrificed to some extent, the additions to the pay-roll might have been considerably smaller. On the Pennsylvania, which, if we may judge by a long course of consistent progress, may be regarded as the most enlightened road in this country as regards block signaling, a prominent feature is the arrangement, on branches, on single track divisions and on pieces of road where traffic is fluctuating or where income does not warrant the most perfect appliances, of signals and regulations for just such signaling as we here recommend. The fact that stations are too far apart for convenient spacing at all times does not interfere with the establishment of blocking rules for use at such times as they can be used. The absence of an operator at a given station at night is not allowed to prevent blocking at that station in the daytime. Inability to block freight trains because they are too numerous does not prevent blocking passenger trains. The necessity of suspending the rules during all ordinary times, in fact, would not interfere with their continuance in full form for use on a moment's notice in extraordinary times. The manager who thinks that this safeguard is available only on a road richer than his, or that he must spend \$50,000 on semaphores and towers before he can make a beginning, should consult the officers of some of the roads we have named.

### Coroner's Juries and Railroad Accidents.

The decision of the coroner's jury in the matter of the Hastings collision is more than ordinarily discouraging. To find ignorance and prejudice where carelessness and a spirit of inquiry ought to be manifested is to be expected as a matter of course in nine verdicts out of ten, but in this case the usual propensity to blunder seems to have been supplemented by a desire to save paper and ink, or the time of the clerk, matters of the utmost seriousness being turned off in a single brief paragraph. The evil effects of such inefficiency are mitigated by the fact that the accused men are to come before a higher tribunal, and that the collision will be investigated by a more competent body—the Railroad Commission; but when one thinks of the innumerable cases where a jury is too lenient instead of too severe, where justice is defeated by not going far enough instead of by going too far this affords little satisfaction; and the injury done to men like Ossman and Delaney by mentioning them in what is virtually a criminal indictment is irreparable in any event, not to mention the injustice of summarily condemning the company for employing "grossly incompetent men" without presenting a particle of evidence. The phraseology of the report lumps the whole personnel of the road, from brakemen up to President, in the same category with Herrick.

The pertinency of these reflections is apparent on a mere reading of the report, and a verdict like this makes one wish that juries, as long as we must have them, could be compelled to pursue their deliberations under the supervision of a magistrate, or some court officer, who should be required to write the verdict. But our aim was not so much to consider these general and admitted defects in our method of administering justice, as to discuss a little more particularly the outrage upon Ossman, the train dispatcher. For the inclusion of him in the charge against Herrick is an outrage, and the fact that the daily papers not only accept the jury's view, but enlarge upon it, demands that the truth be clearly set forth.

Ossman is blamed for not notifying the stations along the road, including Hastings, that the local train was behind the St. Louis express. Should a railroad depend for safety from rear collisions upon a system in which a prompt notice to every station of every irregularity of trains is an essential element? This was the absurd ground taken by the coroner in his report on the collision at Kipton, O., last April—that report holding that the telegraph operator at a small station should be constantly on the watch for a call from the dispatcher—and this is the only rational basis for the plans proposed now by various editors for run-

ning trains on the New York Central. But let us see how these plans will work.

Suppose the local train were detained by a broken locomotive five miles below Hastings at a non-telegraph station; must the conductor notify the dispatcher and he in turn notify the stations? Must the express refrain from passing the local until word can be sent ahead by telegraph? Suppose, again, that a wrecking train, which must be hurried to some point fifty miles away, has to be started out ahead of a local passenger train; is it fair to the people detained by the wreck (and possibly injured) to keep them waiting while notice is sent to every station that the wrecking train is coming? How about the cases, constantly arising, where a stopping passenger train is delayed by trains on connecting roads, and heavy freight trains must be sent ahead of it in order to avoid a blockade in the freight yards? Must these be announced beforehand or else be stopped at every little way-station? Can a railroad be reasonably expected to keep its small stations manned with telegraph operators, unburdened by other duties, to the extent implied by these requirements? When we look at the other side, at the influence on the discipline of brakemen that would be effected by letting them suspend the regulation about exhibiting the red signal on or close to the track and placing torpedoes on the rail, whenever they have reason to think the coming train will stop of its own accord, the absurdity of the argument is too apparent to need explanation even to a snake editor.

The critics ignore the difference between what a dispatcher or a station agent *might* do and what he should be *required* to do. It would be a great convenience if every New York Central station agent could receive immediate information of every disarrangement of schedules, for the benefit of waiting passengers, and such information might some time be of incidental value in preventing a collision. If a station agent were to question every flagman about his work, there would be a possibility of some time averting a disaster through the reminders thus brought out. Either of these possibilities might have proved valuable in the Hastings case. But when the newspapers base their most scathing criticisms of the company on a demand for mere conveniences, which cost more than they are worth as conveniences and are not justifiable as safety regulations; and when a jury charges criminal neglect upon an individual dispatcher for not providing them, when they are not required by the system, the opinions of newspapers and juries must be regarded as of very questionable value. The fact that Herrick did not possess a reasonable understanding of his duties will probably lead people to believe the jurymen when they assert that the employees of the Central generally are of the same character, but such an assumption is wholly unsupported by evidence. If there are 1,000 or 100 men as bad as Herrick on the Central, they certainly ought to be exposed and removed, but mere assertion of a jury like this will not go far toward bringing about the desired result. It is not likely that any court will inflict a penalty upon Ossman; nor, in fact, that any dispatcher or other railroad officer will ever have difficulty in repelling such charges as these when properly inquired into by a court, but as long as the simple making of the charges by a jury has such possibilities of harm to innocent men it is highly desirable to expose the fallacies in them.

### Smoke Prevention in Large Cities.

The recent step taken in Chicago by the commercial and social clubs to abate the smoke nuisance has caused a flood of inventions and propositions. Of course few of the plans proposed are of the least practical value, and none of them will succeed without intelligent care. The first step is to pay higher wages to firemen and get careful men; the next is to give the firemen a chance to do better, by providing a large grate area in proportion to the amount of steam to be generated per hour. Without this, even the most careful fireman cannot always run a steam plant at all times without smoke. An increase in the amount of steam demanded per minute through the city of Chicago is immediately followed by an increase of smoke. This is noticeable when there is a sudden darkening of the city by a cloud causing an increased demand for electric lights. At such times the smoke pours out in volumes from all the electric light plants and from the large office buildings having steam plants which furnish power for lighting.

It has been suggested that hard coal be used instead of soft throughout Chicago; but the cost per year to the people would be something over \$5,000,000. Soft coal must be used, and without producing an objectionable amount of smoke. This is possible and perfectly feasible. It only requires that a small percentage be added to the annual cost for steam power, which increase must be applied to the betterment of the steam boiler settings and to an increase of the wages of the firemen. There is no other way out of it. None of the smoke pre-



venting devices will run automatically, and there are conditions under which their use will cause smoke instead of preventing it. It is popularly supposed that to prevent smoke is to make a saving in cost of fuel, but generally speaking this is not true. It will cost more to prevent a boiler plant from smoking than the fuel saved will amount to.

The possibility of making smokeless steam plants is well illustrated in Chicago in cases where the cheapest Illinois coal is used. There are plants generating over 300 H. P. in some of the public buildings from which scarcely any smoke issues. The reasons are plain to any mechanical engineer who examines the plant. The boilers have large heating surfaces and grate surfaces in proportion to the steam used per hour. Ample provision is made for admitting the proper amount of air to the fire, when needed, above the incandescent fuel. The fireman is intelligent, and puts on coal in small quantities, and fires first on one side of the furnace and then on the other. In fact, the whole plant is merely a combination of the well-understood means of running a stationary boiler economically. There are no secrets and no patents. The application of patented appliances may in some cases be advisable, as by an intelligent use of them smoke can be reduced in a plant which is badly constructed. Thus the use of a steam jet to blow air in over the fires is in some cases a sufficiently good smoke preventer when the steam is turned on to the proper amount. In all cases it must be regulated by the fireman.

Smoke from locomotives is difficult to prevent, and the best devices for its prevention when operated in the most intelligent manner are of little value under some of the prevailing conditions. A large grate area and abundant heating surface will assist in reducing the smoke, but the largest areas attainable on a locomotive are not sufficient to allow the engine to do its regular work without considerable smoke. The best and cheapest way to get a non-smoking locomotive is to use coke fuel. This is the plan adopted by the C., B. & Q. and some other large roads entering Chicago. No change is required in the grates or other details to do this, and there is no difficulty either in firing or in keeping steam up when the fireman has become accustomed to the fuel.

One Chicago road will soon try several engines with large grate areas adapted to burn cheap anthracite screenings, hoping thus to lessen the smoke without increasing the cost for fuel. This is, of course, an experiment, and the results cannot be foretold, but it promises well. The smoke problem will be well studied in Chicago this year, and the results cannot fail to be useful everywhere that soft coal is used as fuel.

Among the other misinformation which came out in the discussion of the Hastings collision, was the statement, in a four-column editorial of a technical contemporary, that the Providence & Worcester (now a division of the New York, Providence & Boston) had been equipped with automatic block signals for its entire length since 1881—ten years. Carefully prepared statistics are given, showing comparisons of mileage, traffic and earnings on that road and on the New York Central, the "branches" of each road being assumed to have one-tenth the train mileage of the main line, in order to get at the traffic of the latter by itself. The radical error in this pretty little comparison is that the Providence & Worcester has no block system, except on about six miles at the Providence end. Electric track-circuit signals (the clock-work system of the Union Switch and Signal Co.) are in use at each station for local protection, but most of these were put in during 1882, or later. A track circuit signal is an admirable protection for a station, and would be still more admirable if the confusion of stop and caution signals, existing in most of the rules for using these signals, were eliminated; but in comparing the Providence & Worcester with the New York Central it is no more than fair to state that the latter several years ago equipped its switches with distant signals, thus affording good protection for most stations; and if we mistake not the stations without switches were equipped with the same kind of signals—hand-operated semaphores. The Providence & Worcester deserves credit for putting in the automatic signals, but the New York Central also deserves credit for its man-operated signals, and the difference in degree of credit is not so great as might at first appear. But when it comes to a comparison on the block system—on the maintenance of an absolute space interval between trains over any considerable length of road—the two companies are in the same boat. It is good to know that the Providence & Worcester has been free from collisions, but this fair record must be due to something besides the block system.

The committee appointed by the Chicago City Council to consider rapid transit has its hands full. At nearly every meeting three or four cranks are present with impossible schemes. One of the most significant of the communications yet received by this committee is the one from Mr. Charles T. Yerkes, who built the North Side cable road. His advice is highly colored by his wishes. He suggests that the people who are employed "down town" should patiently wait on the corners of the streets until they can get a seat. His words are as follows: "We know that people are now compelled to wait for transportation, but it should occur to them that

waiting conduces to the comfort and convenience of all. The American people want to be of the crowd, and if there are four trains on a track all starting for the same point at the same time, the first train is crowded, the others go comparatively empty." Probably Mr. Yerkes does not know what it is to wait on the corner of the street on a cold night, until the people who will not wait and those who have been waiting are furnished with seats. The whole gist of the matter is that the cables cannot pull many more cars than they now do, and the addition of more cars per hour in the busy portion of the day causes trouble with the conductors and drivers, unions. It is safe to say that the committee appointed by the council will not recommend the public to wait for a chance to ride.

To show the amount of traffic on the North Chicago cable road during the busy hours, a statement has been prepared showing that during the rush hours 58 passengers were carried per car on the average, and some of them carried over 100. The seating capacity is 24; the rest stand up. A secret meeting is to be held by the committee this week, at which the officers of the street railroad companies will have a chance to answer questions relating to the inefficiency of the roads which they represent.

The Chicago & South Side Rapid Transit Railroad Co., which is building the "Alley" elevated railroad in Chicago, has closed contracts for the locomotives with the Baldwin Locomotive Works. There are to be 20 compound locomotives of the four-cylinder type. The engines are to be quite different in details from those used on the Manhattan road. They will weigh 28 tons when loaded, have 42 in. wheels, and 66 x 44 in. grate. The weight on drivers will be about 40,000 lbs. The engines are to have frames of wrought iron, all in one piece from end to end instead of a channel bar extension at the rear, as the case is with the Manhattan engines. They will have the McDowell safety check, asbestos lagging, pressed steel casings and trimmings, wrought iron pistons, cast steel crossheads, wrought iron driving wheels, steel axles and crank pins, phosphor bronze driving boxes, steel cabs, steel draw-bars, and will be built under a guaranty for performance. The design is new in many respects. The boilers will be radial-stay, wagon-top, and it is expected that there will be little or no sound from the exhaust, and no cinders will be thrown from the stack. Every effort has been made to embody in these engines the experience of the other elevated roads in this country and to bring the details of construction up to the best practice of the present time.

The Interstate Commerce Commission has decided that people in schedules 2, 6, 8, 10, as classified by the Boston & Maine, have no right to ride free; and that editors and milkmen, whose passes, after all, are tickets and not passes, will be considered later. The decision is printed in our traffic columns. As the Boston & Maine officers, like most others, are doubtless glad of a pretext for withdrawing a good share of the annuals we may now expect to see a shrinkage in its "free list," and the result will be worth watching. As in most other matters affecting traffic, however, a chief point of interest will be, where there is any competition. How is the rule carried out by the other roads? Luckily for the Boston & Maine its territory is largely monopolized by itself, however, so there is nothing to hinder a thorough trial of the reform, but much of the trouble, after all, is not in interstate but intra-state traffic. United States Senator Chandler, who made the complaint against the Boston & Maine, has now asked the State Railroad Commissioners of New Hampshire to enforce the law of that state, forbidding the issue of free passes, and has presented a bill in Congress to strengthen the provisions of the Interstate Commerce law. It provides that giving free transportation except as allowed by the act shall be deemed unjust discrimination, and shall be punished as provided by the act. Railroads must keep a record of passes issued, and the record is to be at the disposal of stockholders of the road, the State Railroad Commissioners and the Interstate Commerce Commission.

#### NEW PUBLICATIONS.

*A History of Railroad Track Systems and Their Construction.*—A German work on the above subject\* by A. Haarmann, has been reviewed at some length by Dr. Wedding before the *Verein für Eisenbahnkunde*. It is the result, in a measure, of the prize competition instituted in 1885 by that Society for an historical essay on the development of the permanent way of European railroads. No prize was awarded in that competition; but it had the effect of stimulating the preparation of the work under consideration, and the latter, it may be added, has extended far beyond the limits imposed by the rules of the competition.

The volume\* treats, as may be inferred, of the track proper, without reference to the building of such accessories as bridges, street crossings, tunnels, etc., and is divided into three principal parts, one of them being devoted to the history of the permanent way considered generally; another, to a specific history of track systems; and the third to the history of tracklaying.

In Part I. the history of railroads is traced back to Babylonian times, but only such matter is presented, in

concise shape, as will be of value to engineering readers and essential to a proper understanding of the succeeding portions of the work.

Chapter II. is devoted to the rail proper, and to a history of the development of rail sections. According to Dr. Wedding, the main interest in this centres in the large number of well executed illustrations which are given, and which, as will be readily understood, practically tell the whole story.

Chapter III. treats of the next most important part of the subject—the ties. This is subdivided into two sections, one of which embraces wooden and stone ties, and the other metal ties, the latter being, for obvious reasons, the more elaborate of the two. In the next chapter the author takes up the subject of rail fastenings for the different varieties of ties considered, and the matter is treated in detail without needless elaboration or repetition. Rail joints are next treated. The chapter devoted to them is of special interest and shows how many of the devices, tried in recent years, are really of comparatively old origin, and were successively brought into use and again discarded years ago. At the same time it shows that some of the devices which proved inadequate in earlier periods, and were accordingly consigned to the scrap heap, have more recently been turned to good account, largely because of improved methods of manufacture and the development of other details contributing to a generally satisfactory performance. Switches form the subject of the concluding portion of the first main division of the work and are disposed of in a short chapter.

In Part II., devoted to track systems, the different subdivisions have been made with reference to the kinds of ties used and the nature of their disposition. Accordingly, the author divides the various track systems into stone tie systems and the different wooden and metal tie systems, concluding with a consideration of what he terms tie-rail systems.

In Part III. the history of tracklaying as already indicated is taken up, the first chapter beginning with a discussion of the matter of gauges; the second treating of grades and curves; the third, of the building of the road-bed, and another, of track maintenance, renewals, etc. In a final chapter the question of costs is briefly touched upon. The original intention of the author was to embrace in the volume a discussion of materials. This plan, however, has, for the present, been abandoned, but may be followed up at a later date.

Dr. Wedding speaks of Mr. Haarmann's work as by far the most exhaustive contribution to the literature of the subject.

*Transactions of the Canadian Society of Civil Engineers.* January to June. Henry T. Bovey, Secretary, Montreal, Can.

This is a pamphlet of 210 pages with several folded sheets of engravings. There are seven different papers, all of which are important. Those which will probably have the greatest interest to our readers are Mr. Corthell's paper on An Enlarged Waterway between the Great Lakes and the Atlantic Seaboard; the Construction of the Coteau Bridge, by Mr. G. A. Mountain, Chief Engineer, and Railway Curves, by Mr. H. K. Wicksteed. Mr. Corthell's paper was given by very brief abstract in the *Railroad Gazette* some months ago, but that abstract gave an inadequate idea of the value of the paper. As it is published here it is supplemented by a brief discussion.

#### The Prices of Iron and Steel During 1891.

Mr. Swank, in the *Bulletin of the American Iron and Steel Association* gives the prices by months of iron and steel, which have been very constant. They are summed up below:

	Highest.	Lowest.	Average.
Old iron T-rails at Philadelphia..	\$23.50	\$21.00	\$22.05
No. 1 anthracite at Philadelphia..	17.75	17.50	17.52
Gray forge pig iron at Philadelphia..	14.75	14.25	14.52
Gray forge Lake ore at Pittsburgh..	15.00	13.50	14.05
Bessemer pig iron at Pittsburgh..	16.50	15.15	15.85
Steel rails at mills, Pennsylvania..	30.00	29.00	29.52
Best refined bar iron, Philadelphia..	2.00	1.85	1.90
All muck bar iron, Pittsburgh..	1.80	1.68	1.71
Cut nails, Pittsburgh..	1.65	1.55	1.58

All of the above prices are for gross tons of 2,240 lbs., except for refined and muck bars which are given per 100 lbs., and for cut nails which are priced per keg of 100 lbs.

Articles.	1886.	1887.	1888.	1889.	1890.	1891.
Old iron T-rails at Philadelphia..	\$21.42	\$22.97	\$22.23	\$24.19	\$25.18	\$22.05
No. 1 anthracite foundry pig iron, at Philadelphia..	18.71	20.92	18.88	17.75	18.40	17.52
Gray forg. pig iron, at Philadelphia..	16.40	17.79	16.21	15.48	15.82	14.52
Gray forge pig iron, Lake ore mixed, at Pittsburgh..	16.58	19.02	15.99	15.37	15.78	14.06
Bessemer pig iron, at Pittsburgh..	18.96	21.37	17.38	18.00	18.85	15.95
Steel r. i. s. at mills in Pennsylvania..	34.59	37.09	29.83	29.25	31.75	29.92
Best refined bar iron, from store, at Philadelphia..	1.92	2.20	2.01	1.94	2.05	1.90
All muck bar iron, at Pittsburgh..	1.70	1.95	1.77	1.71	1.85	1.71
Cut nails (base price), at Pittsburgh..	2.17	2.15	1.90	1.90	1.90	1.58
Cut nails at Philadelphia, from store..	2.27	2.30	2.03	2.00	2.00	1.86

The *Railroad Gazette* has heretofore called attention to the growing steadiness of prices in this country which has apparently been concurrent with the increasing

\* *Das Eisenbahn-Gleise.* By A. Haarmann, General Superintendent of the Georg-Marien Mining & Iron Co., Osnabrück. Historical Section, with 1,637 woodcuts. Published by Wilhelm Engelmann, Leipzig, 1891.



make of pig iron, and the table quoted from above seems to offer confirmatory proof of this. Mr. Swank also gives the following table showing the remarkably uniform course of average prices for the six years ending with 1891, or since we have made 5,000,000 tons or more annually.

#### Commerce of the St. Mary's Falls Canal.

General O. M. Poe, the United States Engineer in charge of the canal at the "Soo," and of nearly all the channels in the Great Lakes above Buffalo, makes a tabular report which we condense somewhat below. The canal was open 228 days in 1890 and 225 in 1891:

COMPARATIVE STATEMENT OF THE AMOUNT AND VALUE OF COMMERCE THROUGH ST. MARY'S FALLS CANAL, FOR THE CALENDAR YEARS 1890 AND 1891.

Items.	Quantity.		Increase.		Decrease.		Valuation.	
	1890.	1891.	Per cent.	Per cent.	Per cent.	Per cent.	1890.	1891.
Vessels, Number.....	10,557	10,191			3			
Lockage, Number.....	4,970	4,981			0			
Tonnage, registered, net tons.....	8,454,435	8,400,695			1			
Tonnage, freight, net tons.....	9,041,213	8,898,759			2			
Passengers, Number.....	24,856	26,190			5			
Coal (hard and soft), net tons.....	2,176,925	2,597,532			19		87,619,237.50	88,776,362.00
Flour, barrels.....	3,239,194	3,790,113			17		16,105,620.00	18,900,715.00
Wheat, bushels.....	16,217,570	38,816,570			139		15,393,022.00	38,440,272.60
Grain (other than wheat), bushels.....	2,044,394	1,032,104			50		2,003,456.92	1,011,461.92
Manufactured iron, net tons.....	93,615	12,560			87		4,680,753.00	2,128,090.00
Pig iron, net tons.....	22,712	27,181			19		398,104.00	462,077.00
Salt, barrels.....	179,431	231,528			31		179,431.00	231,528.00
Copper, net tons.....	43,729	69,190			36		8,745,800.00	13,838,000.00
Lumber, M. feet, B. M.....	4,774,708	3,590,213			25		16,711,698.00	12,469,745.50
Lumber, M. feet, B. M.....	301,929	386,905			28		8,514,722.00	6,592,400.00
Silver Ore and Bullion, net tons.....	3,432	1,731			50		527,807.28	266,210.49
Building Stone, net tons.....	47,973	44,080			8		479,730.00	440,800.00
Unclassified Freight, net tons.....	371,294	417,083			12		22,277,640.00	25,025,590.00
Totals.....							\$102,214,948.70	\$128,178,208.51
Steamers.....	7,339						\$53,413,472.13	
Sails.....	2,405						60,080,071.95	
Unregistered crafts.....	447						79,631,737.78	
Total.....	10,191						82,156,019.57	
Included in unclassified freight 1891:							83,782,327.15	
Wool.....	2,602 tons and						162,214,948.70	
Hides.....	469 tons						128,178,208.51	

lished a tariff as required by law, also against the New York, Lake Erie & Western, the Lake Shore & Michigan Southern and the Cleveland, Cincinnati, Chicago & St. Louis roads for failure to post their schedules of rates, fares and charges for the transportation of passengers.

In the same month, in Chicago, indictments were found against Thomas Miller, General Freight Agent of the Chicago, Burlington & Quincy, for discrimination in transporting corn from Nebraska to Chicago at less than the established tariff rate for Wright & Haughey; also against John M. Egan, general manager of the Chicago, St. Paul & Kansas City, for transporting corn at a reduced rate from Iowa to Chicago for McFarlin, Regur, Bowen & Co.; also against John M. Johnson, general freight agent of the Chicago, Rock Island & Pacific, for transporting corn from Kansas City to Chicago at a reduced rate for A. C. Davis & Co.

#### TECHNICAL.

##### Manufacturing and Business.

The Boston & Albany has for some time been experimenting with an automatic adjuster, for taking up the slack or lost motion on the brake rods. It is the invention of Mr. Desoe, Brake Inspector of the road, and has given very satisfactory service. It was illustrated in the *Railroad Gazette*, June 5, 1891. By its use a definite braking power is at all times maintained and any wear of the brake shoes or slack in the rod is adjusted. The Mason Regulator Co., of Boston, is to manufacture this device and put it on the market.

The National Switch & Signal Co., of Easton, Pa., has recently been awarded contracts for interlocking plants on the Central Railroad of New Jersey as follows: At Fiddler's Green, 48 lever machine, and at the Newark meadows crossing with the Lehigh Valley road, 12-lever machine.

The Westinghouse Machine Co., of Pittsburgh, Pa., make the announcement that the Baldwin Locomotive Works after having some time since changed from the use of large Corliss engines as the motive power for their shops to a number of Westinghouse "Standard" single-expansion engines placed in the immediate vicinity of greatest work, are now changing these "Standard" engines for the Westinghouse "high-duty compound" engines of latest make. The Westinghouse Co. state as a conclusion from a comparative test made at the Baldwin Locomotive Works that a saving of 30 per cent. on the coal bills will be realized when a complete change has been effected.

Representatives of the Thomson-Houston Electric Co. have stated that that company will probably erect a large factory for the manufacture of electrical supplies at Pullman, Ill. This is an important step in the electrical supply business, as the plant will be a large one and will give to the west a quicker delivery than can be got when all the material is shipped from the east. It will add materially to the town of Pullman, as there will be more than 1,000 hands employed. The advantage to the Thomson-Houston Co. is evident. Their employees will have the facilities of the beautiful town of Pullman including libraries, clubs, opera house, etc., which they could not have within a reasonable distance of the factory were they to locate at any other place in the vicinity of Chicago. Mr. Pullman has stated that he is not interested in the new departure in any other way than as an owner of the land which is to be purchased.

##### Iron and Steel.

The directors of the British Columbia Iron Works have decided to increase the capital stock to \$250,000.

##### Shop and Station Notes.

The opening of the new Edison Shops of the Northern Pacific at Tacoma, which was delayed by the non-arrival of the electric light engines, occurred Jan. 4, and several thousand people were present at the ceremonies. These shops were described in the *Railroad Gazette* of Oct. 30, 1891, and in other issues.

##### Car Couplers.

Apparently reliable information is given that M. C. B. couplers by one of the principal makers are being sold to railroads with full guarantee for less than seventeen dollars a car.

##### Car Lighting.

The South Side Rapid Transit Railroad (Alley) of Chicago has adopted Pintsch gas for lighting and is in the market for 50 cars to be equipped with this system, to be delivered April 1.

The New York Central is building at its West Albany shops eight postal cars, which are also to be equipped with the Pintsch light. These are 60 ft. cars with all the modern improvements.

##### Electric Ventilating Fans.

Electrically driven ventilating fans for dwelling houses, workshops, offices and public resorts generally are receiving considerable attention in Germany. The *Allgemeine Electricitäts-Gesellschaft*, of Berlin, among others, is prominent in advertising their merits and securing their extensive use. This movement among German engineers may be taken as a flattering tribute to American engineering enterprise, to which the development in this field is primarily due.

##### Electric Lighting for Shops.

The Edison General Electric Co. is installing in the car shops of the Great Northern at St. Cloud, Minn., an electric lighting plant. It will have a capacity of 500 16-c. p. lamps.

##### The New York & New Jersey Bridge.

Little importance is to be attached to the recent breaking of ground on both sides of the Hudson River by the New York & New Jersey Bridge Co., which appears to have been a mere formality. The situation of affairs with this company may be summed up briefly thus: It is, as is probably well known, a recent consolidation of two companies which hold charters from the states of New York and New Jersey, under which they may build a bridge across the Hudson River. The consolidated company will endeavor this winter to get a charter from Congress. When that is done and certain guarantees,

During the 225 days the canal was open the average number of vessels passing per day was 45.3 and for June, July, August and September the average was 54.6. Since 1887 the average tonnage of vessels passing through the locks has increased from 626.3 registered tons to 862.1 tons in 1891 or 37.6 per cent.

Since the completion in 1881 of what was then the new lock, iron ore has given 45 per cent. of the freight passing through the canal and in 1889 and '90 it was more than 50 per cent. During this time the increase in tonnage has been 22 per cent., varying between 12 and 39 per cent., but as shown in the table there has been a decrease of 1 per cent. in the registered tonnage and 2 per cent. in the freight tonnage and all of this decrease is assigned to the reduction in iron ore shipments as other freight has increased from 4,206,445 net tons to 5,328,548 tons, or 25 per cent.

Other co-operating causes for the reduced freighting through the canal were: The late start made by the lake marine, quite two weeks having been lost by many of the largest carriers; and the low stage of water, the average available depth for 1891 having been but 14.42 ft., as against 15.06 in 1890 and 15.14 ft. the year before. General Poe estimates that "if the available depth of water in the canal during 1891 had been equal to that of 1890, the same 9,744 vessels which carried 8,888,759 tons in 1891 would have carried 1,641,359 tons more than they did, or an aggregate of 10,530,118 tons; or, say, 10,000,000. This is no violent estimate, but is, I think, quite near the truth." The sinking of the steamer Susan E. Peck across the channel, by which navigation was suspended for a full five days, is also accountable for diminished commerce, and General Poe concludes that the commerce would have been fully 10,500,000 tons if it had not been for these circumstances.

#### Enforcement of the Interstate Commerce Law.

An examination of the records of the various Federal Courts for the years 1890 and 1891, for the purpose of ascertaining what action has been taken toward the enforcement of the penal provisions of the Interstate Commerce Law, discloses the following cases. The list possibly may be incomplete, but is accurate as far as it goes. It will be seen that a majority of the cases are of indictments which thus far have led to no conclusive trial. The first eight paragraphs refer to proceedings that have been taken against railroads and railroad officers; the last six to cases against shippers.

In the case of the United States vs. Michigan Central and several of its officials, an indictment was found for discrimination in transporting corn for Counselman & Co. from Chicago to New York at less than tariff rate. This case was brought to trial and the indictment was quashed as to the railroad company, the Court holding that a railroad company was not subject to be indicted under the Act. One of the defendants, Arthur W. Street, was afterward tried and found guilty and a fine of \$3,000 was imposed, which has since been remitted by the President of the United States.

In October, 1890, indictments were found in Ohio, against the Cleveland, Canton & Southern for transportation of a party of passengers at a reduced rate of fare between Canton and Springfield without having pub-

In November, 1890, Albert Stimson and Charles Stimson, the general agent and local agent of the Cleveland, Cincinnati, Chicago & St. Louis, were indicted in Indiana for transporting corn at reduced rates from La Fayette to Cincinnati for Sam Finney.

In January, 1891, indictments were found in St. Paul against John M. Egan and C. H. Holdredge, General Manager and General Passenger Agent of the Chicago, St. Paul & Kansas City, for selling tickets for transportation from St. Paul to Chicago at the rate of \$7 each, the tariff for first class unlimited tickets being \$11.50. This case was afterward tried and the Court charged the jury that the tickets in question might properly be regarded as limited tickets, and directed a verdict of acquittal.

In April, 1891, an indictment was found in Kansas City against W. D. Mott, a Weighmaster at East Atchison, for underbidding the weight of lumber for the benefit of Howell, Jewett & Co., and conspiring with the members of said firm to obtain in that manner transportation for their lumber at less than the legal rates. George W. Howell, S. R. Howell and Herbert N. Jewett were joined in the indictment.

Indictments have also been recently found in Kansas City against Milton Knight, freight traffic manager, and S. B. Knight, general freight agent of the Wabash, for reducing the rate charged consignees in Kansas City by the payment of commissions.

A similar indictment has also been found in Springfield, Ill., against the officers of the same company, with reference to the transportation of grain; also in St. Louis, against the same parties, in connection with A. Fell, western freight manager Delaware, Lackawanna & Western; G. B. Spriggs, general freight agent New York, Chicago & St. Louis Railroad; P. H. Wyckhoff, general freight agent Central Railroad of New Jersey; Eugene Field, of the Toledo, St. Louis & Kansas City Railroad, and F. W. Fowkes, of the Philadelphia & Reading.

Charles H. Edmundson, Secretary and Manager of the Empire Line Co., of Hannibal, Mo., was indicted for falsely billing line for transportation and procuring a false report of the weight thereof by bribing the railroad weighmaster. This case was brought to trial in June last, when the defendant pleaded guilty to the fourth and fifth counts of the indictments and was fined \$100 and costs on each count.

Willoughby H. McCormick, of Baltimore, was indicted for procuring the transportation of 60 cases of Lamott's bitters at a reduced rate by falsely representing the cases to contain mineral waters. He was tried in May, and a verdict of guilty rendered and a fine of \$100 was imposed.

Howell, Jewett & Co. were indicted, as above stated, in Kansas City for conspiring with a weighmaster to obtain short weights upon lumber, and a similar indictment has recently been found against the same parties in St. Joseph.

James H. Long, an agent of the Illinois Steel Co., was indicted at the October (1890) term, in Chicago, for a manipulation of rates, whereby the Illinois Steel Co. obtained transportation of coke from Pennsylvania to Joliet at less than the regular rates over the lines of the Pennsylvania and Chicago & Alton.

In May, 1891, indictments were found in Memphis, Tenn., against W. R. Robertson, T. J. Keyer and E. L. Dorr for inducing J. C. Rogers, agent of the Nickel Plate Line, to discriminate unjustly in their favor in the transportation of cotton from Memphis to Lowell, Mass. Rogers was also indicted at the same time for complicity in the transaction. This case was not pros'd when brought to trial at Memphis, Dec. 10.

In June, 1891, James M. B. Kehlor was indicted in Springfield, Ill., for procuring the officers of the Wabash to pay a commission of 1½ cents per 100 lbs. upon flour transported for him from Litchfield to Montreal, which commission is said to have been paid to one W. C. Ellis, an employé of said Kehlor, for the use of the latter.

Or at least assurances, of revenue from the railroad companies which reach the Hudson River on the west side have been obtained, the really serious work of financing the scheme will be undertaken. We are assured, however, and it certainly seems probable, that with a congressional charter and with the certainty of the use of the bridge by the railroad companies there will be no difficulty in securing the necessary capital, which is estimated at about \$40,000,000. The designs for the bridge and for the terminals and approaches are being prepared by Mr. T. C. Clarke, whose name will command respect in engineering and financial circles. Mr. Clarke does not propose a suspension bridge but wishes to have a pier in the river near the Jersey shore. Probably this will be stoutly opposed, but if the permission is secured a cantilever bridge will be built, the longest span of which will be 2,200 ft., with two flankings of 1,050 ft. each. The piers and masonry will be built for an eight-track bridge, but the superstructure will be built for only four tracks, as it is estimated that these will be sufficient for all the traffic that will be offered for a good many years to come. It is designed that the west approach shall be carried through the Bergen hill either by a tunnel or open cutting. This will enable all of the railroads to reach the bridge with grades of less than 40 ft. to the mile. On the New York end the landing will be at about Seventy-first street, and the line then carried down Eleventh avenue to Forty-second street and across to Broadway. Another line will be carried up the east shore of the river and so around under 155th street and across the Harlem, connecting with the roads coming in from the north. The grades on the east side are also to be kept below 40 ft. per mile. Thus trains of all classes can be run through either way if desired, and ample terminals are planned for the New York end. We shall show various plans of this structure and the terminals in an early issue.

#### Smoke in Chicago.

At the Union League Club conference of Chicago clubs to consider the smoke nuisance 19 clubs were represented, also the Board of Trade and Real Estate Board. Franklin H. Head, President of the Union League Club, stated that by a careful estimate he had found that between 7,000,000 and 8,000,000 tons of bituminous coal is used in Chicago annually. If anthracite was substituted the cost would be increased as much as \$18,000,000 to \$20,000,000 per year; hence, the power needed must be produced from the cheaper coal. It is necessary, then, to face the smoke nuisance. To remove it is not impossible, as shown by the results of the Rookery, Rand-McNally, Home Insurance, and other buildings where bituminous coal is used without excessive smoke. Oil fuel has been suggested to reduce the smoke, but the expense prohibits it. Certain steps will undoubtedly be taken shortly, one of which is to establish a high pressure water plant to reduce the number of individual steam plants used for elevators. A central steam supply system is not considered feasible as it is believed by Chicagoans to have been a failure in New York City. A central compressed air plant is believed to be inefficient and expensive.

As a result of the agitation a society for the prevention of smoke has been incorporated. The incorporators are the men who were appointed as a committee at the above meeting. They will open headquarters and will employ a competent engineer and an attorney. This is the most decisive step taken thus far, and will lead to a test of the legality of the ordinance which has been passed making it an offence to run a smoke nuisance within the city limits.

#### Safety Stop for the Janney Coupler.

In our last issue we described a safety stop just brought out by the McConway & Torley Co. to get over the danger of M. C. B. drawheads pulling out and dropping on the track. In that description there was one inaccurate statement, to the effect that the stop is not applicable to the Butler draft rigging. What should have been said is that the stop is applicable to this form of rigging when it is used with a draft bolt, but is not applicable or necessary where the yoke is used. The Butler draft rigging was first designed to use with a tail bolt, but has been modified to permit the use of a yoke.

#### Carrying a Torpedo Boat Overland.

In a little pamphlet\* recently issued at Paris, an account is given of an overland trip of one of the smaller torpedo boats of the French navy. The experiment of thus carrying a vessel of moderate size was prompted by the desire on the part of the French government to determine the possibility of having available crafts of this kind on the Mediterranean as well as the northern coasts of France even in the event of a blockade of the straits of Gibraltar. The available waterways in France for transporting a vessel to these coasts were scarcely adequate to the requirements and it was, therefore, concluded to try the carriage by railroad. The vessel used for the purpose was a 40-ton torpedo boat, 33 metres, (108 ft.) long and of 3.4 metres (12 ft.) beam, and the car employed was of special make. The trip from Toulon to Cherbourg occupied 6 days and 13 hours and was accomplished most satisfactorily. The undertaking was in the hands of General Inspector of Bridges and Roads Partiot.

\*Partiot. Transport d'un torpilleur. Paris, 1891. Librairie Polytechnique. Bandry & Co.

#### THE SCRAP HEAP.

##### Notes.

The Baltimore & Ohio has issued an order requiring the inspection of employes' watches every three months.

The New York, Lake Erie & Western has put in a new interlocking tower at Hornellsville, containing 23 levers.

The South Carolina Legislature has rejected the proposed law requiring separate accommodations in passenger trains for white and black passengers.

The Empire State Express from New York to Buffalo, the running time of which is 52 miles an hour between stations, made up 33 minutes lost time the other day.

The Michigan Central freight house at St. Thomas, Ont., was burned on the night of Dec. 30. Sixteen hundred bales of cotton, in cars at St. Louis, were destroyed by fire on the night of Dec. 27.

The New York State Railroad Commissioners have approved of the continued use by the New York Central of oil stoves in buffet cars. These stoves are carefully made, and are bolted to the car, and nothing is used in them except sperm oil of 300 degrees fire test.

The United States Supreme Court has sustained the South Carolina Court's decision affirming the validity of the law providing that the expenses of the State Railroad Commission shall be borne by the roads in the State, the roads being taxed on the basis of mileage.

Adelbert Sly, the chief of the gang that robbed a Missouri Pacific train near St. Louis Nov. 30, has been captured. A Buffalo paper prints an item to the effect that Oliver C. Perry, a New York Central brakeman, has confessed to the robbery of an express car on that road Oct. 1.

The North Carolina Railroad Commissioners have effected a compromise with the Pullman Palace Car Company so that that company pays the state tax heretofore in dispute. The valuation of the cars passing through the State is \$564,000, of which \$130,000 is apportioned to North Carolina.

A nine ton casting fell off a platform car of the Pennsylvania Railroad lately and was not missed until the car reached the Edgar Thomson Steel Works at Bessemer, where the operation of the works had to be suspended some time on account of its loss. The casting was finally found in the Susquehanna River near Columbia.

The Old Colony and the Boston & Maine have taken out policies in the American Casualty Insurance and Security Co., of Baltimore, insuring the roads against all liability for personal injuries either to employes or the public. It is said that the insurance company assumes all the care incident to the investigation and settlement of claims.

The suit instituted by Charles A. Leib in the United States Circuit Court at Chicago, several months ago, against the Electric Merchandise Co. of Chicago for an infringement of a patent of rail bonds for electric street railroads, was decided last week, Judge Blodgett of that court giving a decision in favor of the Electric Merchandise Co., and against the claims of the plaintiff.

Ramsay & Kenyon, of St. Paul, Minn., have been recently appointed the agents of the Tudor Iron Works of St. Louis in St. Paul and the Northwest. The firm, which is composed of Robert S. Ramsay and George M. Kenyon, also acts as Northwestern Agents for the Mordey & Crossing Works at Chicago and the Belleville Steel Co., of St. Louis.

There has been a strike of the messengers of the Southern Express Co. on the Illinois Central, for the reason, it is said, that the company withdrew a recently granted increase of pay. At Jackson, Tenn., a new messenger was taken off an arriving train by a body of sympathizing railroad men. The messengers say the company must show sufficient cause for the dismissal of the chairman of the Grievance Committee before they return to work.

Several newspapers at Pittsburgh and elsewhere have printed an item stating that Vice-President McCrea of the Pennsylvania lines west of Pittsburgh had lately issued a circular assuring the employes that promotions would hereafter be made strictly according to merit. Mr. McCrea states, however, that no such circular has been issued, or thought of; and calls attention to the fact that such a policy has not only been long in vogue on the Pennsylvania lines but that it has been closely adhered to.

The Kansas Railroad Commission has decided that a locality cannot demand additional train service from a railroad company on account of having voted municipal aid to the road at the time of its construction. This ruling was brought by the citizens of Linsburg against the Union Pacific; but while the board declines to justify an increase of service on the plea of municipal aid, it holds that the added service is due the public in this case and the road is ordered to put on a passenger train daily, except Sunday, in addition to the present service on this branch of the road, the increased service to be supplied by Jan. 17.

The San Antonio & Aransas Pass road, which was compelled to abandon all trains for several days on account of a strike, effected a partial resumption of business on Jan. 1. The strike was started by the telegraph operators, and subsequently supported by the trainmen on the

plea that working without the operators was unsafe. On the night of Jan. 4 strikers overpowered the watchman at Yoakum and dismantled 15 locomotives. There was other violence and strong guards were placed on some of the passenger trains that were run by new men. A party of trainmen and telegraph operators, who were on the way to take the places of striking men, were ejected from a car on the St. Louis, Iron Mountain & Southern, at Argenta, Ark., on Jan. 1, by a mob of railroad employes. The car in which the men were was cut from the train, and the men were driven into the swamps. The car was again coupled to the train, but at Little Rock, a mile farther, another mob took possession and destroyed the baggage of the hated passengers. The dispatches state that no steps were taken to punish the perpetrators of the outrage. Threatened strikes of telegraph operators have been reported on the East Tennessee, Virginia & Georgia road and elsewhere, but there seems to be but slight basis for the reports. The Southern Pacific has taken back the striking operators on its Pacific system, the company having, according to the despatches, made some concessions.

#### World's Fair Notes.

It is reported that an arrangement has been made between the city authorities and the Illinois Central whereby the lake front may be used for docks and piers for passenger transportation to the World's Fair.

A vote of thanks has been prepared by the directors of the World's Fair to be sent to Mr. James Dredge, editor of *Engineering* (London), in recognition of his services in furthering the interests of the World's Fair.

#### Foreign Notes.

The Egyptian Government and the Suez Canal Co. have agreed upon the construction and operation by the latter of a steam tramway and a fresh water canal between Port Said and Ismailia. The railroad will be used exclusively for mails, passengers and the service of the Canal Company. The fresh water canal is for the supply of Port Said and stations between that place and Ismailia. It is doubtless well known that for many years a railroad and a fresh water canal have been in operation along the Suez canal from Ismailia southward to Suez.

The deficient supply of food in many parts of India continues, and while it is not called a famine, the government is obliged to continue active measures for relief. Relief works on a large scale have become a necessity in Madras and the Indian Government has been asked for a large number of engineers. In the Ballary district relief works for 40,000 people at least must be provided. There are at present employed in various districts under the Madras Government over 15,000 people on relief work.

A fatal collision recently occurred on the Northwestern Railway of India, about 70 miles south of Lahore. Over 30 persons were killed and a large number injured. The collision is said to have been due to a mistake on the part of a station master.

Any extension of the Burmese railroads to the Shan States must be adjourned until after 1896 unless the grant for that work is increased.

Martial law has been declared along the line of the Trans-Caucasian Railroad by the Russian Government, with the view of effectively suppressing train robberies which, of late, appear to have occurred with alarming frequency.

Norwegian railroad statistics for the year 1890-91 have just been made public and show, among other things, that on June 30, 1890, the total extent of the Norwegian railroad system amounted to 1,562 kilometres. Of this length 592 kilometres had the standard gauge width of 1.435 metres (about 50 1/2 inches), while the remainder had a 1.067-metre (42-in.) gauge.

Among the latest additions to railroad lines employing fireless locomotives, the *Annales des Travaux Publics* cites the extension of the old-established line from Marly to St. Germain and Paris, and the new line from Paris to Boulogne. Still another line is to be built to connect Villefranche and Tarare.

Among the latest Bulgarian railroad projects is one for the construction of a road from Sophia to the Turkish frontier, passing through Pernik and Kustendil. It is proposed also to subsequently extend this line to connect with the Nisch-Uskub-Salonica line. With the carrying out of these projects, Sophia and its neighboring districts, which latter are already in railroad communication with the capital, will be put in direct communication with Salonica, which now cannot be reached from Bulgaria except by a great detour by way of Nisch and Uskub.

Agreements have been concluded between the government of Cape Colony and the Netherlands Company for the completion of the Pretoria & Vaal River Railway to meet the Cape extension. The Cape Government advances £400,000.

#### Spanish American Notes.

The new narrow gauge railroad from Rosario, near the northern boundary line of Argentine, southeast to the city of Cordoba, has been opened to traffic, thus completing the system of roads of uniform gauge from Rosario to Jujuy, 120 miles from the Bolivian frontier. Formerly freight from the northern provinces had to be transhipped at Cordoba, whereas they can now come through to tidewater in the same car.

Owing to the disturbances in Chili work upon the Buenos Ayres & Valparaiso Trans-Andine Railroad has been stopped upon the line from Los Andes toward the frontier, and the company has petitioned the Argentine Government to permit the establishment of a temporary terminus at Punta de las Vacas, kilometre 142, a point considered by the company's engineers as most convenient for the development of traffic with Chili.

The Uruguay Northern Railway is now complete and in operation into Brazilian territory. A "saladero," or meat packing establishment, is being started near the Brazilian terminus at San Eugenio, which will add to the traffic on this road. The capital invested is \$3,716,000, upon which the government has guaranteed interest, and the payment of which interest the government has promptly defaulted.

Some ten years ago a British syndicate offered to undertake the payment of the Brazilian national debt in con-



sideration of a cession to it of the Central Railroad. At that time (1881) the net earnings of this system were \$3,963,000 a year. Although the reckless management under the new republic reduced this net income to \$1,676,721, for 1890, the opportunity to restore the line to its former prosperity made its acquisition eagerly sought by numerous bidders when the late dictator decreed that it should be leased for 33 years. This road will now continue in the hands of the government, but it would seem that considerable repairs were needed from the fact that the engine drivers a few weeks ago gave notice that the track was so dangerous that unless immediately repaired it would be unsafe for further traffic, and they would decline to run the locomotives.

The Amazon Steam Navigation Co., Ltd., has declared its half-yearly dividend of three per cent., free of income tax. The line, although sold to a native Brazilian syndicate, remains under the old English management, owing to failure on the part of the Brazilians to make their expected payment.

The United States and Brazil Mail S. S. Co. have offered to the Brazilian Government free transportation of exhibits from that country to the World's Fair at Chicago.

The Nitrate Railways Co. of Chili have declared a half-yearly dividend of \$4.84 a share.

The Venezuelan Government has authorized the opening of the Guanta Railway, and coal shipments will commence about Feb. 1. The company owning the mines has arranged for a delivery of 30,000 tons of coal in 1892.

The special consular report on coal and coal consumption in Spanish America ought to induce efforts on the part of Americans to seek the Southern market. English coal is almost exclusively used in South America, the prices ranging about as follows: In Argentina, \$12 to \$14 a ton; in Brazil, \$10 to \$16, and in Uruguay, \$12 to \$13. Coal is also exported to the west coast of South America. We might easily secure good rates on coal to the west coast, considering that vessels will load with nitrate for New York cheaper than for European ports, because they can secure cargoes readily in New York for Liverpool, at which point they load again for South America. If we could give such vessels a return cargo of coal for Peru and Chili we could obtain rates as favorable as those given to English shippers.

#### Bonds Listed at the New York Stock Exchange.

The Governing Committee of the New York Exchange has added to the lists for dealings securities as follows: Chicago & Northwestern—\$7,675,555 additional common capital issued in exchange for Milwaukee, Lake Shore & Western stock, a like amount of the latter to be stricken from the list.

East Tennessee, Virginia & Georgia—\$500,000 additional equipment and improvement 5 per cent. gold bonds, making the total amount listed \$6,000,000.

Illinois Central—\$600,000 additional 4 per cent. gold bonds of 1892, making the total amount listed \$15,000,000; also \$904,000 additional capital stock, making the total amount listed \$45,000,000.

Louisville & Nashville—\$328,000 additional first mortgage 5 per cent. collateral trust gold bonds, making the total amount listed \$5,120,000.

Montana Central—\$1,500,000 additional first mortgage 5 per cent. gold coupon and registered bonds, making the total amount listed \$2,000,000.

Norfolk & Western—\$105,000 additional 5 per cent. 100-year mortgage gold bonds, making the total amount listed \$7,105,000.

Pittsburg, Shenango & Lake Erie—\$2,740,000 first mortgage 5 per cent. gold bonds, 1890-1940.

St. Paul, Minneapolis & Manitoba—\$155,000 additional consolidated mortgage 6 per cent. gold bonds (interest reduced to 4½ per cent.), making the total amount listed \$28,443,000.

Ulster & Delaware—\$1,353,000 first consolidated mortgage 5 per cent. gold bonds.

#### Canada's Trade.

A summarized statement of the trade returns of Canada for the year ending June 30 last, has been issued by the Customs Department. The year's total trade was \$218,384,000, a slight decrease from 1890. Exports to Great Britain were \$49,280,000, an increase of over \$900,000; to the United States, \$41,138,000, an increase of nearly \$700,000. Imports from Great Britain were \$42,047,000, and from the United States \$52,685,000, so that the total trade with the United States exceeded trade with Great Britain by \$2,500,000 in round figures. Canada's total trade with Newfoundland was \$2,218,000. Total exports of the Dominion were \$98,417,296, an increase over 1890 of \$1,167,000. The total imports were \$119,967,000, a figure which has only been exceeded once since 1883. The exports last year were no greater than in the year 1881, but the imports have increased about \$14,000,000 in the last ten years.

#### Iron Making in Lake Superior.

The West Duluth Furnace Co. is now producing pig iron. When the furnace was first started up there was considerable trouble from gas, but during the last two weeks this trouble has been overcome.

#### British Shipbuilding in 1891.

The tonnage built in Great Britain and Ireland for the past three years has been as below:

	1891.	1890.	1889.
Tons			
England	770,767	777,116	814,824
Scotland	389,541	416,617	386,841
Ireland	165,476	77,377	90,271
Total	1,225,784	1,271,110	1,300,936

Thus 1891 was a fairly prosperous year for production. During the year there has been a large amount of Government work executed, not only in the dockyards but in private yards, so that the addition to the mercantile marine is not so great as the figures at first glance might be taken to imply. Still the increase under that head is certainly more than the position of the freight market and the outlook for trade warrant. As respects the prospects for 1892, while reliable data are difficult to procure, there is every reason to believe that a great addition to our merchant navy will be made. Orders have been freely placed of late, and the books of many builders are very well filled.—*London Economist*.

#### A Railroad School.

The technical school, founded at Bienne, in Switzerland, last year, has added to its several departments a railroad section which, it is expected, will, in the near future, place at the disposal of railroad companies better material for efficient railroad employees than is now available. The new section is under the patronage of the Jura-Simplon Railroad Co., and of the Swiss Federal Railroad Department, and its object will be to

turn out two classes of prospective employees, one to comprise members of the engineering staffs, conductors, yardmen, firemen, foremen of road gangs, etc., and the other, office clerks and employees in the business departments generally. Candidates for admission to the school must not be less than 16 nor more than 22 years of age and must show evidence of having had a primary school education or its equivalent, and of having passed at least two years in one of the more advanced schools. The school was opened on Aug. 1, 1891, with 42 pupils.

#### An Auxiliary to the Passenger Department.

The newspapers have been printing a long interview with Chauncey M. Depew, President of the New York Central & Hudson River, defending his custom of spending a good deal of time on other matters than those connected with his immediate duties as President. He enlarges upon the necessity of relaxation and says, in effect, simply that his method of securing variety of occupation is different from that of most other people; and he concludes with the remark, referring to his road's share of the traffic of New York city: "I do not claim that my speeches produce this result or any considerable portion of it, but the passenger agents, both of the Central and rival lines, tell me that they notice an appreciable difference in travel by our lines, as the public appearances of the President are more or less frequent."

#### The Railroad from Jaffa to Jerusalem.

A French company is issuing about \$1,800,000 of five per cent. bonds of this railroad, which it has contracted to build for the bonds and stock, viz., \$800,000, which has already been subscribed. The company was organized by virtue of a firman giving an absolute concession for 71 years to construct a railroad from Jaffa to Jerusalem, 54.4 miles, with the option of extensions to Nablous, in the direction of Damascus, and to Gaza toward Port Said. All bonds are to be repaid by annual drawings extending over 68 years.

#### An Erie-Ontario Ship Canal.

Senator Davis has introduced a bill for the construction of a ship canal around Niagara Falls, in the State of New York, for the passage of merchant and war ships from Lake Ontario to Lake Erie. The canal is to be located in Niagara County, along one of the routes for a ship canal heretofore surveyed by the United States, if either of such routes be deemed feasible. The canal is to be of sufficient width, depth and capacity to easily, safely and expeditiously float vessels of as great length, width, draught and tonnage as can be floated through the St. Marys Falls Canal and locks when the latter are completed. In case none of the routes already surveyed are found feasible the Secretary is to cause surveys, plans and estimates to be made for such canal along some other route. The sum of \$1,000,000 is appropriated to be applied to the construction of the canal.

#### Street Railroad Troubles in Chicago.

The West Side cable and horse car lines in Chicago have already struck a difficulty in putting on what are called "trippers"; that is, cars that run a few trips during the crowded hours of the day. The conductors and drivers have been offered \$1.50 for from four to six trips per day, while those who work a full day get \$2.10, according to the contract with the labor unions. Now, the West Side Company has 250 cars ready to put in service, and the conductors' and drivers' unions are threatening a strike unless they are paid a full day's wages for a half day's work.

#### LOCOMOTIVE BUILDING.

The Minneapolis & St. Louis has placed an order for two switching engines with the Baldwin Locomotive Works.

The Calumet & Blue Island Railroad has placed orders with the Baldwin Locomotive Works for five compound freight locomotives.

The Chicago "Alley" elevated railroad has placed with the Baldwin works contracts for 30 compound engines, 4-cylinder type. Particulars of these will be found in the editorial columns.

A large order for locomotives has been placed with the Schenectady Locomotive Works by the Chicago & Northwestern system. Of these 20 are for the Chicago, St. Paul, Minneapolis & Omaha.

The Baldwin Locomotive Works have closed a contract with the Baltimore & Ohio Railroad for 40 locomotives of the following classes: 13, 20 x 26 ten-wheel locomotives with driving wheels of 60 in. diam.; 10, 21 x 26 consolidation locomotives with driving wheels of 30 in. diam.; 12, 19 x 24 six-wheel switching engines with driving wheels of 50 in. diam.; and five, 19 x 24 eight wheel passenger engines with driving wheels of 72 in. diam. Delivery is to be made in February and March next. None of the engines included in this contract are compounds. Complete drawings and specifications for these engines were furnished by the General Superintendent of Motive Power of the Baltimore & Ohio.

#### CAR BUILDING.

The Norfolk & Western is asking bids for 2,000 box cars.

Fifty of the new passenger cars for the Chicago & South Side Rapid Transit Co. are to be delivered by April 1. They will have steam heat, pintech gas lamps, and seats arranged like those on the Manhattan elevated. The cars will be the best that can be built for the service, and every attention is being paid to the most minute details.

#### BRIDGE BUILDING.

**Billings, Mont.**—The work of erecting the superstructure of the iron bridge on the Northern Pacific has been commenced.

**Dawson, N. B.**—The Dominion Government is being asked to grant a subsidy toward the erection of an iron railroad and carriage bridge across the Pettedocine River, near Dawson, or some other convenient point of junction with the Salisbury & Harvey road.

**Duluth, Minn.**—The plans of the Superior Belt Line & Terminal Co. for a bridge across the St. Louis River at Duluth have been approved by the War Department. It is understood that the Duluth, Red Wing & Southern will enter Duluth over this bridge.

The Board of Public Works has received a number of plans for bridging the canal to Minnesota Point. While only drawbridges are eligible in the competition for the \$1,000 prize, it is probable that one of the lift type will be constructed.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Canadian Pacific*, semi-annual, 2½ per cent., payable Feb. 17.

*Central of New Jersey*, quarterly, 1½ per cent., payable Feb. 1.

*New York Central & Hudson River*.—The quarterly dividend declared Dec. 30 was 1½ per cent. and not 1 per cent. as stated last week. The directors voted to increase the regular dividend from 4 to 5 per cent. a year, and to carry this into effect declared a special dividend of ½ per cent. out of the surplus earnings for the quarter ending Sept. 30 last, both dividends being payable Jan. 15.

*Patterson & Hudson River*, semi-annual, 4 per cent., payable Jan. 4.

*Patterson & Ramapo*, semi-annual, 4 per cent., payable Jan. 4.

*Pittsburgh, Fort Wayne & Chicago*, quarterly, 1½ per cent., payable Jan. 2; and special, 1½ per cent., payable Jan. 25.

*Southwestern (Georgia)*, semi-annual, \$3.50 per share, payable Jan. 2.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Addison & Pennsylvania*, annual, 49 Broadway, New York City, Jan. 11.

*Albany & Poughkeepsie*, annual, Norfolk, Va., Jan. 18.

*Arkansas & Louisiana*, annual, Washington, Ark., Jan. 25.

*Columbus, Hocking Valley & Toledo*, annual, Columbus, O., Jan. 12.

*Daguerroville & Elk*, annual, 505 Chestnut street, Philadelphia, Pa., Jan. 11.

*Dallas & Greenville*, annual, Dallas, Tex., Jan. 19.

*Dallas & Waco*, annual, Dallas, Tex., Jan. 19.

*East Broad Top Railroad & Coal Co.*, annual, 320 Walnut street, Philadelphia, Pa., Jan. 11.

*Houston, Central Arkansas & Northern*, annual, Dermott, Ark., Jan. 18.

*Keokuk & Western*, annual, Keokuk, Ia., Feb. 3.

*Kings County (Elevated)*, annual, 346 Fulton street, Brooklyn, N. Y., Jan. 13.

*Lehigh Valley*, annual, 228 South Third street, Philadelphia, Pa., Jan. 19.

*Little Schuylkill*, annual, 410 Walnut street, Philadelphia, Pa., Jan. 13.

*Mine Hill & Schuylkill Haven*, annual, 119 South Fourth street, Philadelphia, Pa., Jan. 11.

*Nequehoning Valley*, annual, 228 South Third street, Philadelphia, Pa., Jan. 11.

*New York & Middle Coal Field*, annual, 228 South Third street, Philadelphia, Pa., Jan. 12.

*New York, Ontario & Western*, annual, 18 Exchange Place, New York City, Jan. 20.

*North Pennsylvania*, annual, 240 South Third street, Philadelphia, Pa., Jan. 13.

*Norwich & Worcester*, annual, Worcester, Mass., Jan. 13.

*Philadelphia & Reading*, annual, 227 South Fourth street, Philadelphia, Pa., Jan. 11.

*Philadelphia, Wilmington & Baltimore*, annual, Wilmington, Del., Jan. 11.

*Pittsburgh & Lake Erie*, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 26.

*Pittsburgh, McKeesport & Youghiogheny*, annual, Pittsburgh, Pa., Jan. 26.

*St. Louis, Vandalia & Terre Haute*, annual, Greenville, Ill., Jan. 12.

*Shamokin, Sunbury & Lewisburg*, annual, 227 South Fourth street, Philadelphia, Pa., Jan. 11.

*Toledo & Ohio Central Extension*, annual, Marietta, O., Jan. 11.

*Western & Atlantic*, annual, Atlanta, Ga., Jan. 30.

*Western & Atlantic*, annual, Atlanta, Ga., Jan. 30.

*Western & Atlantic*, annual, Atlanta, Ga., Jan. 30.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* will hold its next meeting in the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, Jan. 21, commencing at 7:30 o'clock p. m.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Truck and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.



The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The Engineers' Club of Minneapolis meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The Canadian Society of Civil Engineers holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The Association of Civil Engineers of Dallas meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The Technical Society of the Pacific Coast holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

#### American Society of Civil Engineers.

At the meeting of Jan. 6 the Secretary announced the preliminary arrangements for the annual meeting, and said that the programme would be given out within a week.

The discussion of the paper on the Red Rock Bridge, set down for the evening, was not had, there being no one present who cared to take it up.

The discussion on Mr. Waddell's paper, "Some Disputed Points in Bridge Design," was taken up. The Secretary said that he had in hand some 300 pages of type written manuscript discussion and it was decided not to attempt to read any of it, but to devote the time to oral discussion. Messrs. Hardy, Thomson, Seaman, Skinner and Devon spoke on the subject. Mr. Hardy's argument was for lattice pony trusses for short spans as there were many situations where the room between clearance and top of rail would not admit plate girders unless they were put in as half deck structures. His experience in maintaining pony trusses (lattice) had been that they were sufficiently stiff and durable.

Mr. Thomson said that plate girders are cheaper than pony trusses, quicker to erect and safer in derailments. He is building one of 100 ft. span with ballasted floor that will not cost more than a pony lattice without solid floor. He has contracts out for plate girders of 120 ft. span. The longest single span with solid floor that he knows of (truss) is 200 ft., but he expects that within six months contracts will be let for 250 ft. spans. We shall attempt no further report of this discussion for the reason that fragmentary notes of a subject so complicated cannot be very satisfactory, but it is evident that Mr. Waddell's object in stirring up discussion has been accomplished.

A paper by Mr. R. B. Stanton, on the Colorado Cañon Railroad was read by title and Major Dodge spoke on railroads in cañons from his own large experience.

The following were elected:

**Members.**—James Work Deen (b. 1832) Division Engineer D. & R. G. R. R., Salida, Colo.; William Milburn Gordon, Division Engineer Yankin R. R., Albemarle, N. C.; Herbert Franklin Northrup, Division Engineer Chicago & West Michigan Ry., Traverse City, Mich.

**Associates.**—Charles Allen Cockroft, Syracuse, N. Y.; Howard Hudson Cole, Assistant Engineer Harlem River Bridge Commission, New York City; William Hasson Converse, Engineer and Bridge Contractor, Chattanooga, Tenn.; Alexander Potter, Assistant Engineer, Stanwix Engineering Co., Rome, N. Y.; Friedrich Rosenberg, Pueblo, Col.; Albert Smith, Borough Engineer, Washington, Pa.

#### Engineers' Club of Cincinnati.

The fourth annual meeting of the club was held Dec. 18 with 40 members present. Messrs. Charles E. Lindsay, H. Hamkens, Chas. F. Koch and Jas. A. Stewart were elected members, and five applications for membership were received. The committee appointed at a special meeting held on Dec. 15 to draft resolutions on the death of Col. W. E. Merrill, who was one of the founders of the club and its first president, presented resolutions which were unanimously adopted, and with some very appropriate remarks by Mr. G. B. Nicholson and Mr. M. D. Burke, ordered spread on the minutes.

The secretary presented his report for the year, which showed a membership at date of 105, an increase of nine during the year. There was one death, five members resigned, and four others were dropped from the rolls. The treasurer's report was also submitted. The following officers were elected to serve during the coming year: **President**, Samuel Whinery; **Vice-President**, Latham Anderson; **Directors**: W. B. Ruggles, H. J. Stanley and E. A. Hill; **Secretary and Treasurer**, J. F. Wilson. The retiring president read a very interesting report giving a general résumé of the engineering progress during the past year.

#### Iowa Civil Engineers' and Surveyors' Society.

The fourth annual meeting of the Iowa Civil Engineers' and Surveyors' Society has been held at Burlington, Ia., the past week. There was a fair attendance of members from all over the state. Among the papers read were "Permanent Reference Marks," by C. W. Bisbee, county surveyor of Monona County, and "Clay for Paving Brick," by Vice-President Steyb, of Burlington. The officers elected are: **President**, Wm. Steyb, Burlington; **Vice-President**, Mr. Cole, Keokuk; **Secretary and Treasurer**, Seth Dean, Glenwood.

#### New England Railroad Club.

The regular meeting of the club will be held at the United States Hotel, Boston, Wednesday, Jan. 13, at

7:30 P. M. The subject for discussion is "Locomotive Boilers and their Attachments."

#### Ohio Society of Surveyors and Civil Engineers.

The thirteenth annual meeting of this society will be held in Celtic Hall, corner Chestnut and Fourth streets, Columbus, O., Jan. 19, 20 and 21. The following programme has been prepared:

**Tuesday, Jan. 19, Afternoon Meeting, 1:30 p. m.**: Reports of officers; election of members; report of special committee on bill for licensing surveyors, C. H. Burgess, Chairman, Cleveland.

**Tuesday, 7 p. m.**: Report of Committee on Legislation, C. N. Brown, Chairman, Prof. Civil Eng. O. S. U., Columbus; The Muskingum River Bridges, T. C. Connor, Zanesville; Design for a Brick Arch, A. L. Morgan, Asst. Eng. C. & M. V. R. R., Zanesville; The Jacksonville Bridge, O. Benson, Canton; Report of Committee on Blanks and Instruments, L. W. Matthewson, Chairman, Cincinnati.

**Wednesday, 8:30 a. m.**—Report of Committee on Surveying, J. T. Buck, Chairman, Cardington; The County Surveyor, John C. Grim, Bryan; Tracing Old Lines, John S. Sih, Ashtabula, O.; Some Practical Experience in Land Partition, Samuel F. Rock, Div. Eng. R. N. I. & B. R. R., Irvine, Ky.; Address of President, Thos. R. Wickenden, Toledo.

**Wednesday, 1:30 p. m.**—Record of Surveys, D. W. Seitz, Ottawa, Ill.; City Surveys, W. A. Ginn, Bellefontaine, O.; Platting Town Lots, Geo. McGormley, Tiffin, O.; Report of Committee on Code, J. D. Varney, Chairman, Cleveland.

**Wednesday, 7 p. m.**: Reading Report of T. C. Mendenhall, Supt. U. S. C. and G. Survey, on the Boundary Survey between Ohio and Indiana; Notes from the Northwest, A. W. Jones, Asst. Eng. Wisconsin Cen. Lines, Waukesha, Wis.; Artificial Stone in Construction, Samuel Bachtell, Asst. Eng. State Board of Public Works, Columbus.

**Thursday, 8:30 a. m.**—Report of Committee on Highways, J. B. Weddell, Chairman, Galion; Width of City Streets, Samuel Whinery, Vice-Prest. Warren Scharf Asphalt Co., Cincinnati; Brick Pavements, Harry L. Weber, Bucyrus; Specifications for Turnpikes, Geo. H. Hill, Milford; Improvement of County Roads, G. S. Innis, Columbus; Removing Detritus from the Galion Sewers, J. B. Weddell, Galion; Report of Committee on Drainage, F. M. Davison, Chairman, West Manchester.

**Thursday, 1:30 p. m.**: Report of Committee on Civil Engineering, J. B. Strawn, Chairman, Salem; Reservoir of Niles (O.) Water-Works, J. B. Strawn, Salem; Construction of Sewers in Small Towns, W. E. Myers, Prof. of Eng. in Ohio Normal University, Ada; County Ditch Assessments, Homer C. White, Mineral Ridge; and Details of Ditch Location, A. D. Sheldon, Whittlesey.

Other papers are promised. This meeting promises to be a very interesting one, and important as affecting the future of the society. Several amendments to the constitution and by-laws and the appointment of a permanent secretary will probably be acted upon. Drafts have been prepared of bills on legislation affecting engineers to be submitted to the Ohio legislature, and the discussion is expected to be full and important. T. R. Wickenden, of Toledo, is President of the society, and G. D. Wileman is Secretary and Treasurer.

#### The Engineers' Club of Philadelphia.

A regular meeting was held Jan. 2, Past President Henry G. Morris in the chair, and about 30 persons present, including two visitors.

The Secretary announced that the annual meeting would be held Jan. 16.

#### SOFT STEEL IN BRIDGES.

Mr. F. H. Lewis concluded the discussion of his paper on The Use of Soft Steel in Bridges and the accompanying Specifications for First Class Bridge Superstructure, as follows: Referring to Prof. Burr's objection to the amount of detail in the specifications, I would say that I have purposely added a considerable mass of detail for the very reason which Prof. Burr urges against such a course, viz., because with the better class of bridge builders it is largely unnecessary. It is there for the protection of such companies. Bridge work is now figured on such very small margins that contractors of a certain class will not furnish first-class work unless it is distinctly specified, otherwise the burden of proof is thrown upon the engineer and his inspector.

Another reason for full details is that bridges are now planned not so much for the loads as for the traffic, and nothing, in my judgment, adds so greatly to the life of a bridge under these conditions as first-class work in the details. To discuss "steel" in general or abstract terms is merely a waste of time. Steel is essentially an alloy, exactly as the bronzes are. It varies in character from that of a material having a texture much like wax, to that of one having the properties of glass. The very able papers which Mr. William Metcalf has read before the American Society and the Pittsburgh Club are open to criticism for lack of discrimination in this respect.

The most important suggestion I have had on the question of the use of steel was received outside of the discussion in the club, viz., that it is desirable to place a limit on the thickness of punched steel. The thicker the material the greater is the damage caused by punching. In my original paper I urged the use of moderate sections in members subject to impact, but I neglected to give this suggestion practical effect in the specifications. The tests presented show that punching injures steel less than iron, up to, say,  $\frac{1}{2}$  in. thickness, at which point the two materials are about equal in this respect. Beyond this point the value of steel after punching decreases quite rapidly as the thickness increases. In iron the percentages seem to be much more constant, the range being only from 82 to 72 per cent. The character of the fracture after punching is also materially affected by the thickness of the material, as will be seen by examining the photographs submitted.

I have therefore decided to limit the thickness of punched material in the specifications, and for most members I do this by drawing the line at that thickness where the crystalline fracture appears and the stretching qualities decline. I propose to limit to  $\frac{1}{2}$  in. the thickness of materials subjected to punching, except that in girders over 50 ft. long it may be  $\frac{3}{4}$  in. in top-chords and end posts  $\frac{1}{2}$  in., and in shoes, pedestals and bed plates  $\frac{3}{4}$  in.

So far as I know, the only other bridge specifications which take this matter into consideration are the Wheeling Terminal Bridge specifications of Mr. Job Abbott, which provide a limit of three-quarters of an inch, with preference for five-eighths of an inch. I am surprised to hear no comment upon the subject of reaming. All the tests submitted with my paper show the value of efficient reaming. But in practical work the efficiency of reaming, being based upon the character of the punching, must clearly be affected by the deficiency of the

latter. If reaming does not accomplish its object in practical work, we must either punch steel and leave it unreamed, or drill it in the solid. In that case I should say punch all members which are not more than one-half an inch in thickness and drill all heavier material.

#### LAND SLIDE.

The Secretary read, for Mr. Emile Low, a paper entitled A Large Land Slide, of which the following is an abstract: The slide referred to occurred in a cut 343 ft. long and of about 50 ft. maximum depth, on the line of the Clinch Valley Division of the Norfolk & Western Railroad, in Southwest Virginia, about 30 miles west from Graham Junction, on the New River Division. The ground fell but slightly, transversely to the axis of the line, but the limestone rock in which the cutting was made, and which occurred in layers about 2 ft. thick, lay at an angle of about 45°, the line of cleavage being about parallel with the railroad line. This stratum was overlaid with one of earth and loose rock. In consequence of the dip of the rock, the lower side of the cut, as shown in a photograph accompanying the paper, was nearly vertical, while the slope of the upper side was much flatter. The amount of material taken from the cut by the contractor before the occurrence of the slide was nearly 28,000 cu. yds. The cut was dressed up in good shape and the track laid through it about the latter end of May, 1889. At this time there was no visible indication of any tendency to slide, but on the night of Saturday, May, 25, 1890, or six days before the memorable Johnstown flood, considerable rain fell, and early the next morning the slide occurred, unobserved by anyone. The material, as will be readily understood, all came in from the upper side of the cut, evidently following the dip of the rock. About 400 lin. ft. of the track were covered to an average depth of over 20 ft. with about 6,000 cu. yds. of rock and earth intermixed. Day and night forces, each consisting of about 50 men, were organized, and the accumulation of debris was attacked at five different points, viz., at each end of the cut by dump cars on narrow-gauge tracks, and by three derricks placed close to the edge of the cut on top, two of them on the lower side, and one on the upper side. The two on the lower side were worked by means of a steam hoisting engine and the other one by hand. As much of the material consisted of large slabs of limestone, too large to handle, considerable blasting had to be done. Some little interruption from rain was experienced, but by July 31 the entire mass had been removed and track-laying was resumed on the following day. The narrowness of the cut, which was only 14 ft. wide at sub grade, and the slopes of which were only  $\frac{1}{2}$  to one for the lower 10 ft., greatly impeded the progress of the work, as only one car could be loaded at the face of the cut at one time. The cost of the removal of the slide was nearly \$6,500.

The only explanation of this slide which occurs to the writer is that there may have been an enormous "mud-seam" between the layers of the rock and extending from one end of the cut to the other. The cutting away of the toe by the excavation allowed the superincumbent mass to slide upon this wet seam.

Mr. E. V. d'Inville: It appears to me that the cause of this slide is not far to seek. In the region referred to, with which I am very familiar, land slides are of frequent occurrence, and are due to the geological structure of the region. The formations are badly faulted, strata 2,000 ft. apart geologically being found in close contact. This faulting gives rise to abnormal cleavage, with segregation of clay bands to an extent not found under other circumstances. To the west of the locality referred to, on the Louisville & Nashville Railroad, and on the further side of the Allegheny escarpment, an enormous slide occurred in rocks of a totally different character, but similarly faulted. The ground was practically solid, and its appearance gave no cause for fearing a slide. Nevertheless a slide occurred which cut off communication for several days, and the removal of which entailed a much greater expense than in the case described in Mr. Low's paper.

#### PERSONAL.

—Mr. George W. Gardiner, Master Mechanic of the Northern Pacific at Mandan, N. Dak., died on Dec. 20 after a short illness.

—It is understood that Mr. John H. Inman will resign the Presidency of the Richmond & Danville at the next meeting of the board of directors.

—Mr. Stephen S. Cobb, who was the first state railroad commissioner of Michigan, receiving his appointment in 1873, died last week, aged 71 years.

—Mr. Gardner M. Lane, formerly Vice-President of the Union Pacific, with charge of the financial department at Boston, has recently become a member of the banking firm of Lee, Higginson & Co., of Boston.

—Mr. William Edgar, General Passenger Agent of the Grand Trunk at Montreal, is reported to be seriously ill at Montreal. His condition at one time was considered very serious but it is now believed that he will recover.

—Mr. Cecil Gabbett states that he has not accepted the superintendency of the Charlotte, Columbia & Augusta division of the Central of Georgia or any other position with the Richmond & Danville, as recently reported.

—Mr. Albert Langmoir, who was formerly Master Mechanic of the Northern of New Hampshire in Concord, died at Pembroke, N. H., Jan. 1, aged 75 years. He had been connected with the Northern road for nearly 30 years, and had made his home in Pembroke since 1879.

—Mr. Louis H. Meyer, President of the Pittsburgh, Fort Wayne & Chicago, died at his home at Fort Wadsworth, N. Y., aged 76 years. He had been interested in transportation companies for many years and was the senior member of the banking firm of L. H. Meyer & Co., of New York City.

—Capt. J. W. Woolfolk, Vice-President and Director of the Alabama Midland Railroad, has recently resigned those positions, and he has been succeeded by Mr. M. F. Plant Assistant to the President, of the Plant system, which now operates the road. Capt. Woolfolk is President of the Alabama Terminal & Improvement Co., which built the Alabama Midland.

—Mr. Austin Corbin and Mr. Charles Parsons, President of the Rome, Watertown & Ogdensburg, were elected to the directory of the New York & New England at a meeting in New York this week. Mr. Corbin was elected President of the road, succeeding Mr. J. A.



Bostwick, who has been chosen Chairman of the Board of Directors, a newly created office.

—Mr. Arthur Owen Wilson, a prominent Southern civil engineer and builder of the Huntsville & Monte Sano Railroad, died last week from the effects of a surgical operation. Mr. Wilson's last work was the laying out and development of a resort at Monte Sano, on a mountain near Huntsville, Ala. He was a member of the American Society of Civil Engineers.

—Mr. Y. van den Berg's successor as General Freight Agent of the Louisville & Nashville is Mr. C. B. Compton, the General Agent at Birmingham, Ala. He has been connected with the road for nearly 20 years, being now about 35 years of age. He has served as clerk, Contracting Freight Agent, Traveling Freight Agent, and has been General Agent at Birmingham for three years.

—Mr. C. W. Cheers has been reappointed General Manager of the Columbus Southern, which is to be operated as an independent line. It has been leased to the Georgia, Midland & Gulf for the last year. Mr. Cheers was General Manager of the road before that lease was made and while the road was being operated by the Chattahoochee Brick Co. Mr. Cheers has been Commercial Agent of the Kansas City, Memphis & Birmingham at Atlanta during 1891.

—Mr. E. S. Knibloe has been appointed General Agent for the Lessee of the Buffalo Creek road to succeed Mr. R. F. Goodman, who has moved to Chicago, to engage in business there. Mr. Knibloe was formerly trainmaster of the Buffalo Division of the New York, Lake Erie & Western and has been Superintendent of the Tioga Division for some time. Mr. Henry E. Gilpin has been appointed Superintendent of the Tioga Division and has been succeeded as Roadmaster of the Western Division of the Erie by his former assistant Mr. I. E. Bowen.

—Mr. P. J. McGovern, Assistant General Freight Agent of the Louisville & Nashville at Louisville, resigned soon after the changes in the traffic department noted elsewhere in this column, had been made. Mr. McGovern has been Assistant General Freight Agent of the Louisville & Nashville over a year. It is reported that he has been offered a position on the Richmond & Danville as an assistant to Mr. J. M. Culp, Assistant Traffic Manager of the system, who was formerly General Freight Agent of the Louisville & Nashville.

—Mr. Andrew Peirce died at Clifton Springs, N. Y., on Dec. 19. He was born at Dover, N. H., on July 31, 1814. After some experience in railroad building in New England, he engaged in that work in the West. Mr. Peirce was for a long time President and General Manager of the Atlantic & Pacific and the St. Louis & San Francisco railroad companies. He furnished to his brother, Thomas W. Peirce, the means to construct the Galveston, Houston & San Antonio Railroad in Texas, now forming part of the Southern Pacific system. Mr. Peirce retired from business in 1877.

—Mr. J. H. Benedict, who has been President of the St. Joseph & Grand Island road, representing the second mortgage bondholders, has resigned that office and has been succeeded by President Sidney Dillon, of the Union Pacific, who has heretofore been Vice-President. Under the modification of the agreement with the Union Pacific, the road is to be operated by its own General Manager, and to this position has been appointed Mr. W. P. Robinson, Jr., who was formerly General Manager. He resigned on the reorganization of the operating department of the Union Pacific in January, 1891.

—Mr. John C. Calhoun, Vice-President of the Central of Georgia, and one of its largest individual stockholders and its financial agent in New York, was not renominated at the annual meeting for directors this week. His brother, Mr. Patrick Calhoun, was also left off the regular ticket for directors and he immediately resigned his offices of General Southern Counsel for the Richmond & West Point Terminal and Special Counsel of the Richmond & Danville. Each has issued a statement addressed to the Southern stockholders, defending their policy in the reorganization of the Richmond Terminal.

—Mr. J. M. Turner, formerly Superintendent of the Louisiana Division of the Illinois Central, has been appointed Superintendent of the South Carolina road to succeed Mr. J. H. Agnew, who recently resigned. Mr. Turner is about 40 years old and a Canadian by birth, but has been connected with railroads in this country since 1869, when he became a Station Agent of the Union Pacific. In 1873 he became Train Dispatcher of the Illinois Central, and three years later became Chief Train Dispatcher. He was appointed Assistant Superintendent in 1881 and Superintendent of the Louisiana Division in 1883.

—Governor Russell, of Massachusetts, has nominated Mr. W. J. Dale, Jr., of Andover, as the successor of the late Mr. E. W. Kinsley as State Railroad Commissioner. Mr. Dale was born in Boston in 1850 and has spent most of his life on a farm at Andover. Mr. Dale will be the "business man" on the commission, the theory of the law being that one of the three members shall represent commercial interests. Mr. Dale's nomination is considered a creditable one from that point of view. He was assistant postmaster of Boston for a few years, but the only other political positions he has held have been township offices.

—Mr. William M. Lindsey, just appointed Interstate Commerce Commissioner, was born in Rockbridge County, Va., in 1835, and began life as a teacher in 1854 in Hickman County, Ky., where he studied law and was admitted to practice in 1858. During the war he fought on the Confederate side. At the restoration of peace he returned to Clinton, Ky., and resumed the practice of law. In 1867 he was elected to the State Senate, and in 1870 was chosen to the highest judicial bench of the State. Six years afterward he became Chief Justice of Kentucky, but retired at the end of two years. Since then he has practiced law in Frankfort, Ky.

—Mr. Y. van den Berg was appointed Traffic Manager of the Louisville & Nashville last week to fill the vacancy which has existed for the last few months, since the promotion of Mr. Stuart Knott, to be first Vice-President of the company. Mr. van den Berg has been General Freight Agent of the Louisville & Nashville for about eight months, having previously been General Freight Agent. He has been in the service of the Louisville & Nashville for the last 10 years as Chief Clerk of the Auditor, Traveling Freight Agent and Division Freight Agent since 1884, for two years on the Owensboro & Nashville, and later at Memphis.

—James Wilson McDill, just appointed Inter-State Commerce Commissioner, was born in Monroe county, O., in 1834, was graduated at Miami University in 1853, was admitted to the bar in 1856, and elected Judge of Union County, Ia., in 1859. In 1861 he was appointed Clerk of

the Senate Committee in the District of Columbia and a clerk in the Treasury Department, in which he served until 1865, when he resigned and returned to Iowa. In 1868 he was elected a circuit judge and two years later was elected a district judge. He was elected to the Forty-third and Forty-fourth Congresses and served on the Committee on the Pacific Railroad. He was United States Senator from 1881 to 1883 (appointed to fill Mr. Kirkwood's term) and was a Railroad Commissioner in Iowa from 1878 to 1881.

—The appointment of Mr. P. P. Wright, General Superintendent of the Lake Shore & Michigan Southern to be Assistant General Manager, has been announced, taking effect from Jan. 1. Mr. Wright has been General Superintendent and is one of the many "self made" men in high railroad offices. He has been General Superintendent of the Lake Shore for 11 years. His first position of prominence was with the Kalamazoo Division of the Lake Shore as Division Superintendent, and was afterward transferred to the Buffalo Division. He went to the Erie in 1873 as Master of Transportation, but in 1880 returned to the Lake Shore, and a few months after was appointed General Superintendent. Mr. W. H. Canniff, who has been Assistant General Superintendent, succeeds Mr. Wright as General Superintendent of the Lake Shore.

—Mr. Roswell B. Mason, who was Mayor of Chicago at the time of the great fire, died at that city Jan. 2. Mr. Mason was born in New Hartford, N. Y., in 1805. In early life he worked as a surveyor on the Erie and Schuylkill Canals, and from 1825 to 1831 was Superintendent of the Morris Canal in New Jersey. He was afterward connected with the construction of the Houston, the New York & New Haven and the Vermont Valley Railroads. In 1851 he went to Illinois to superintend the construction of the Illinois Central Railroad, and settled there. He was connected with the construction of several railroads and the improvements on the Illinois and Michigan Canal. Mayor Mason's actions at the time of the great fire are historic. He superintended some of the attempts to stop the great conflagration, and under his order certain buildings were blown up with powder.

—Mr. John B. Carson, formerly General Manager of the Louisville, New Albany & Chicago, died at Chicago last week. He was born in 1833, his railroad experience beginning 20 years later with an engineering party on the construction of the Cleveland, Columbus & Cincinnati road. Between 1854 and 1878 he was engaged in the traffic department of various roads, for six years as General Freight Agent of the Toledo, Wabash & Western, and for five years, to 1878, as General Manager of one of the fast freight lines. For the next six years he was General Manager of the Hannibal & St. Joseph, and in 1883 was appointed Vice-President of the Chicago & Western Indiana, and in the next year President of the road and General Manager of the Louisville, New Albany & Chicago. During his connection with the last two companies Mr. Carson became one of the best known railroad men in the West. He held the latter position until March, 1891, when Dr. W. L. Brefigley, of Louisville, was unexpectedly elected President, with an entirely new board of directors at the annual meeting. Mr. Carson has been in ill health for the last two years and has traveled much of the time.

#### ELECTIONS AND APPOINTMENTS.

**Alabama Midland.**—M. F. Plant has been elected Vice-President of this company, to fill the vacancy occasioned by the resignation of J. W. Woolfolk. His office will be at 12 West Twenty-third street, New York City.

**Altoona Short Line.**—The following are the directors of the company incorporated last week: Samuel P. Langdon, William P. Davis, R. S. Reed, Howard Sidel, John H. Wheeler and William J. Lee, Philadelphia, and James Denithorne, Huntingdon, Pa.

**Atchison, Topeka & Santa Fe.**—The headquarters of J. C. Conroe, recently appointed Division Master Mechanic, has been fixed at La Junta, Col., instead of at Pueblo, as published in a former announcement.

**Atlantic & Danville.**—P. G. Chamberlain has been appointed General Auditor of this road, vice J. Rosenbaum, resigned, with office at Portsmouth, Va.

**Bristol Belt Line.**—Thomas H. Fox has been elected Treasurer of this company, with office at Bristol, Tenn., vice W. A. Stadelman, who continues as General Manager.

**Central of Georgia.**—New directors were elected at a meeting at Savannah, Ga., Jan. 4. Four new directors were chosen in the place of J. C. Calhoun, Patrick Calhoun, S. M. Inman and E. M. Green, who resigned some time ago. The new board is as follows: General E. P. Alexander, J. K. Garnett, Abraham Vetsburg, Joseph Hull, General Henry B. Jackson, George J. Mills, General G. M. Serrell, Savannah; C. H. Phinizy, Augusta; H. T. Inman, E. P. Howell, Atlanta; U. B. Harrold, Americus; James Swann and J. C. Maben, New York. The four new directors are General Henry B. Jackson, General G. M. Serrell, George J. Mills, of Savannah, and J. C. Maben, of New York.

**Chambersburg & Gettysburg.**—J. S. Armstrong has been appointed Superintendent, vice E. W. Krauser, resigned. His office is at Gaefenburg, Pa.

**Chattanooga Southern.**—E. A. Cooper, of Anniston, Ala., has been appointed Superintendent, with office at Chattanooga, succeeding R. H. Bowron, who recently resigned.

**Chicago, Rock Island & Pacific.**—W. M. Hobbs, Trainmaster, has been promoted to the position of Assistant Superintendent of the Illinois Division, headquarters at Chicago.

**Columbus Southern.**—C. W. Cheers has been appointed General Manager, H. C. Hill has been appointed Superintendent and W. C. Waters has been appointed Auditor and Assistant Treasurer, with offices at Columbus, Ga.

**Denver & Rio Grande.**—N. W. Sample has been appointed General Superintendent, with jurisdiction over the Transportation, Machinery and Roadway departments of this company. J. J. Burns having been appointed Superintendent of the First Division, and having resigned the position of Superintendent of Transportation, the latter office is discontinued. He will, as heretofore, perform the duties of Superintendent of Telegraph. The official circulars for these appointments are dated Jan. 1, but they were made public several weeks ago.

**Du'uth & Winnipeg.**—A. W. Wright has been elected President of this company, vice B. N. Baker, who still is at Duluth, Minn.

**East Louisiana.**—E. S. Ferguson, previously Auditor and General Freight and Passenger Agent, has been appointed Assistant General Manager with headquarters at New Orleans, La.

**Esquimaux & Nainaimo.**—A meeting of the shareholders of the railroad was held last week. Alexander Duns-muir, of Victoria, B. C., being re-elected President; James Duns-muir, Vice-President, and Hon. C. E. Pooley, Secretary.

**Fall Brook Coal Co.**—John Magee has been appointed assistant to the president of this company.

**Fitchburg.**—Charles L. Mayne has been appointed Superintendent of the tunnel division, with headquarters at Fitchburg, Mass., to succeed F. F. Adams, who has resigned.

**Fort Worth & Dallas Rapid Transit.**—The company has been organized at Fort Worth, Tex., by John A. James, S. M. Butler, Brooklyn, N. Y.; William M. Phoenix, Morris County, N. J.; E. E. Perkins, Dutchess County, N. Y.; A. M. Carter, L. D. Hall, Max Elser, L. J. Boaz, F. L. Twombly and Charles Scheuber, all of Fort Worth, Tex.

**Genesee & Wyoming Valley.**—The officers of this company are as follows: Robert S. Walker, President; Chas. Q. Freeman, Manager and Treasurer; Chas. H. Root, General Passenger and Freight Agent; E. R. Chapin, Superintendent. General offices, Retsof, N. Y.

**Grand Rapids & Indiana.**—W. R. Shelby, as First Vice-President and Treasurer, now has charge of the Treasury Department of this company and supervision of all matters pertaining to accounting. J. H. P. Hugh-art, as second Vice-President and General Manager, has charge of the Traffic and Transportation departments.

**Illinois Central.**—J. W. Seymour, previously Superintendent Chicago Division, has been appointed Superintendent Wisconsin Division, vice E. G. Russell.

**Kansas City, Ft. Scott & Memphis.**—J. H. Emmert has been appointed General Manager's Assistant, with office at Kansas City, Mo.

**Kansas City, Southwestern City & Southern.**—The incorporators of this Missouri road, referred to last week as chartered, are: J. C. Seabourn, M. A. Lettick, G. W. Smith, W. D. Polson, D. W. Gahagan, John Struthers, W. F. Smith, Dr. C. Johnson, H. W. Grafton, A. Oyler, Geo. W. Corum and L. A. Beamer, all of Southwest City, Mo.

**Kansas City, Wyandotte & Northwestern.**—C. F. Brotherton has been appointed Superintendent. G. Mortsheimer has been appointed Master Mechanic, in charge of the motive power and mechanical departments. Both officers will have their headquarters in Kansas City. The Receiver, Newman Erb, will act as General Manager, succeeding E. Summerfield, resigned.

**Lake Shore & Michigan Southern.**—The following appointments have been announced: P. P. Wright has been appointed Assistant General Manager of the company's lines; W. H. Canniff, appointed General Superintendent; P. S. Blodgett, appointed Assistant General Superintendent; Tracy W. Niles, appointed Superintendent of the Eastern Division, and J. K. Russell, appointed Superintendent of the Franklin Division.

**Louisville & Nashville.**—Y. Van den Berg, General Freight Agent of the road, has been appointed General Traffic Manager. He will be succeeded in the former position by C. B. Compton, General Agent for the freight department at Birmingham, Ala.

**Madison, Alton & Chicago.**—The following are the officers of this road: T. C. Salveter, President; C. W. Fenn, Vice President; P. A. Fusz, Treasurer; J. G. Miller, General Manager; F. B. King, Superintendent. The general offices are at St. Louis, Mo.

**Mexican Southern.**—W. Moreom, formerly Traffic Manager, has been appointed Manager of the operated line, with office at Pueblo, Mex.

**Milwaukee, Lake Shore & Western.**—Chauncey M. Depew and H. McK. Twombly have been elected directors of the road in pursuance of the agreement for the exchange of stock with the Chicago & Northwestern. Marvin Hughitt and M. L. Sykes were elected some time ago and the latter is now Treasurer of the company.

**New Haven & Northampton.**—At the annual meeting of the stockholders of the company this week the following board of directors was elected: Charles N. Yeamans, Westfield, Mass.; George J. Brush, Daniel Trowbridge, E. H. Trowbridge, Charles P. Clark, E. M. Reed, A. H. Robertson, all of New Haven; H. C. Knight, Northampton, and Charles M. Pond, of Hartford. The directors elected Charles N. Yeamans, President; E. M. Reed, Vice President; Edward A. Ray, Secretary and Treasurer.

**New York & New England.**—At a meeting of the directors in New York City, Jan. 6, the resignations of Jonas H. French, C. W. Sinclair and A. W. Nickerson were accepted, and Austin Corbin, F. H. Prince and Charles Parsons were elected in their places. Mr. J. A. Bostwick resigned the presidency of the company and Mr. Corbin was elected President to succeed him.

**Norfolk & Western.**—A. Pope, General Freight agent, having been granted leave of absence, until further notice the duties of his office will be performed by O. Howard Rorer, Assistant General Freight Agent, with office at Roanoke, Va., who will also assume the duties hitherto performed by Mr. Pope as General Eastern Agent of the Great Southern Despatch Line.

**Northern Pacific.**—W. H. Bliss has been appointed Associate Counsel.

**Omaha & Republican Valley.**—This company and the Omaha & Elkhorn Valley, both now included in the Union Pacific system, held their annual election at Omaha, Jan. 6, and chose the following directors: Jay Gould, Russell Sage, Sidney Dillon and A. E. Orr, of New York; E. L. Ames, E. Atkins and F. Gordon Dexter, of Boston.

**Pacific Short Line.**—The following appointments were made on Jan. 1: General Manager and Purchasing Agent, F. C. Hills; Auditor, George Hills; Chief Engineer, L. F. Wakefield; Traffic Manager, J. V. Mahoney; General Freight Agent, J. N. Tittlemore; General Passenger Agent, W. B. McNider; Train Dispatcher, F. W. Ackley; Master Mechanic, J. G. Butterfield. Nearly all of the appointees occupy similar positions with the Sioux City & Northern, and have headquarters at Sioux City, Ia.

**Rio Grande Southern.**—W. D. Lee, Master Mechanic of the company, has been appointed Superintendent, to succeed C. H. Ridgway, who recently resigned.



**Rio Grande Western.**—The office of General Freight Agent has been separated from that of the General Passenger Agent and S. H. Babcock has been appointed to the former position. J. H. Bennett, who will be General Passenger Agent, has heretofore held both offices.

**Rockwood & Tennessee River.**—Orion L. Hurlbut, formerly Secretary, is now General Manager, with offices at Chattanooga, Tenn. Willard Warren, Jr., is Superintendent, with office at Rockwood, Tenn.

**Rome, Watertown & Ogdensburg.**—Leland Wadsworth, who has been appointed Chief Train Dispatcher of the New York Central, has been appointed Assistant Superintendent of this road.

**San Antonio & Aransas Pass.**—H. Michelsen has been appointed General Agent of this line at San Antonio, and will represent the freight department in the city.

**Shreveport & Houston.**—Marcus C. Hawley has been elected President of this road, vice E. L. Remond.

**Sioux City & Northern.**—D. S. Elliott, Secretary, has been appointed Assistant Treasurer also, vice F. C. Hills, who remains President and General Manager. His headquarters are at Sioux City, Ia.

**South Atlantic & Ohio.**—Geo. A. Blackmore has been elected Secretary and Treasurer of this company, vice T. H. Wentworth. C. M. Leilac has been appointed to the position of Assistant Superintendent of this road. The offices are at Bristol, Tenn.

**Tuckahoe & Cape May City.**—Robert P. Wilson, of Vineland, N. J., has been appointed Receiver of the road. This is the outcome of litigation which has been going on in the Court of Chancery of New Jersey for more than 18 months.

**Union Pacific, Denver & Gulf.**—E. D. Hose, who has been connected with the mechanical department of the Union Pacific at Beatrice, Neb., has been appointed Division Master Mechanic of the Fort Worth & Denver City. J. F. White, who recently resigned, had been Master Mechanic about two years.

**Wheeling & Connellsville.**—The officers of this company, now being surveyed east of Wheeling, W. Va., are as follows: President, William A. Lynch, of Canton, O.; Secretary, George Wise, of Wheeling, W. Va., and Chief Engineer, Job Abbott, 150 Broadway, New York City.

**Withlacoochee & Gulf.**—The following are the incorporators of this company in Florida: W. M. Brooks, J. M. Baker, Charles G. Wilson, J. C. Priest and W. J. Barnett.

#### RAILROAD CONSTRUCTION.

##### Incorporations, Surveys, Etc.

**Bristol.**—This is a short line in Vermont, 6½ miles long, built in 1891 from Bristol to New Haven Junction, where connection is made with the Rutland Division of the Central Vermont railroad. This company will commence to run trains some time this month. R. S. Smith is Superintendent, with headquarters at Bristol, Vt.

**British Columbia Roads.**—Application for a charter is being made to the British Columbia legislation for power to construct a railroad from Upper Arrow Lake, by way of Slocan Lake and river, to a point on the Columbia & Kootenai Railroad, and also a branch from the main line to Caslo City.

**Canadian Pacific.**—Thirty-two miles of new track has been laid on the Souris Branch in Manitoba during the past season beyond Hartney, and grading has been completed 24½ miles beyond to Township 1, Range 6, west of the fifth meridian. Track laying will be resumed in the spring as early as weather will permit and the branch completed to the Souris coal fields. The terminal will be at the coal fields. The name has not yet been given to the station and the mining town that will be built there. This company's Southwestern Branch has been extended from Methven West to Nesbitt, Man., a distance of five and eight-tenths miles and this extension is now in operation to the connection with the Souris Branch.

The Montreal & Ottawa line is now being operated by this company from Vaudreuil, a station 21 miles west of Montreal, where it leaves the main line and extends northerly along the south bank of the Ottawa River to Hudson and Rigaud, Que., a distance of 16½ miles. Some grading has been done beyond this point toward Point Fortune, and it is proposed to complete the work to that point this year. It may then be extended further along the bank of the Ottawa River to Ottawa.

**Canadian Roads.**—Application will be made to Parliament for permission to construct a road in British Columbia from Spence's Bridge, on the Canadian Pacific, southeast through Nicola valley to Princeton, about 90 miles, thence to Osoyoos lake, and eastward to the boundary line to Fort Sheperd, on the Kootenay River. A maritime province syndicate seeks a charter to build a railroad from the straits of Canso to Louisburg and Sydney, Cape Breton.

**Chicago & West Michigan.**—The first 21 miles of the Petoskey extension has been opened for regular traffic, the first train being run over the line last week. The main line of the extension runs west from Traverse City to Williamsburg, 12 miles, and thence extends northerly along the shore of Lake Michigan to Petoskey, 80 miles from the southern terminus. The part of this line now in operation includes nine miles of the Elk Rapids branch, which extends from Williamsburg north to Elk Rapids. Over 50 miles of track is now laid on the extension, about 20 miles being on the northern end of the line from Petoskey south through Charlevoix. North of Williamsburg the track has been laid beyond Spencer Creek. The towns on the line are Williamsburg; Barker Creek, 16 miles; Spencer Creek, 25 miles; Bellaire, 30 miles; Central Lake, 44 miles; Ellsworth, 50 miles; Charlevoix, 62 miles, and to Petoskey.

**Coudersport & Wellsboro.**—This company has been chartered by the State Department of Pennsylvania. The line will be 13 miles long, from Galeton, Potter County, to Ansonia, Tioga County.

**Erie & Wyoming Valley.**—The final location has been made for the Honesdale extension, and when the construction of the line is commenced next year the work will probably follow very closely the route now decided. No contracts have yet been let. The new line will be 6½ miles long and will follow the south side of the Lackawanna River, commencing at Hoadleys, a station within a few miles of West Hawley, and extending north to Honesdale. It is parallel to the tracks of the

New York, Lake Erie & Western the entire distance. The work will be comparatively easy, with only one bridge to build, crossing Ona Creek and Valley at Seeleyville with a structure 500 ft. long.

**Flora & Sailor Springs.**—L. W. Barnes and Dr. B. F. Seale, trustees of the proposed railroad, have secured the right of way for this line from Sailor Springs to Flora, Ill., and the projectors of the company have made the towns of Flora and Sailor Springs a proposition that if they will raise certain subsidies they will construct the line at once. Meetings will be held at Flora and Sailor Springs to take action on the proposition, and it is thought that if accepted work will commence on the line soon.

**Fort Worth & Dallas Rapid Transit.**—This company has been organized at Fort Worth, Tex., to connect the cities of Fort Worth and Dallas, Tex., distant about 30 miles from each other, by a direct rail route, the motive power to be either steam or electricity. The cost of building and equipping the line is placed at \$500,000. The line has been nearly all surveyed, and a large part of the right of way secured through Handley, Arlington and Grand Prairie. The road will parallel the Texas & Pacific.

**Great Northern.**—The tracklaying on the Pacific coast extension was completed into Kalispell, Mont., Jan. 1, and the formality of the "last spike" is said to have been witnessed by 2,500 people. Kalispell is to be one of the important towns on the line, and at the end of one of the divisions, with shops and offices. It was founded last May, and is now said to have a population of 4,000 people. It is in the Flathead Lake Valley, about 20 miles west of the main divide of the Rocky Mountains and 265 miles west of Harve, the junction of the extension with the main line.

**Houston, Central Arkansas & Northern.**—The large bridge over the Red River just north of Alexandria, La., was completed Dec. 30 and a train was run into the city the following day. The extension south of Columbia, La., 73 miles long, is now practically completed, with the exception possibly of a few miles of surfacing near the southern end.

**Hutchinson & Southern.**—A report is published that the engineers of the company have commenced the survey near the terminus of the road at the Kansas state line south of Kingman, Kan., for a line southwesterly through the Indian Territory toward Oklahoma City. When the road was built between Hutchinson and the state line, in 1890, a reconnaissance was made for a short part of the distance south of the state line.

**Kansas City, Watkins & Gulf.**—The rails north of Springfield, La., are now being laid toward Alexandria, La., at the rate of over two miles a day and the track will soon be down to a point within six miles of Alexandria. The contractors expect a temporary delay at this point, but not sufficient to defer the opening of the line through from Lake Charles later than Feb. 1.

**Little Wabash.**—The directors purpose to let contracts in a short time for grading part of the line between Effingham and Carmi, Ill. The line between these towns will be nearly 70 miles long, the road extending northwest from Carmi to Effingham.

**Madison, Alton & Chicago.**—Ten miles of this road is now in operation, connecting at Madison, Ill., with the works of the Madison Car Co., which controls the line, and with the St. Louis Merchants' Bridge and with all lines diverging from East St. Louis. The road does no passenger business.

**Maine Central.**—The construction work now in progress for a second track from Gardiner to Augusta, Me., is being carried on entirely by the company's men. The section of new double track work is about seven miles long, and the track is now being put down as fast as the grading is completed. It will not be put in operation as double track until next season.

**Marion & Rye Valley.**—The incorporation of this company in Virginia has been recently noted. It is only proposed to build six or seven miles at present from Marion, Va., to mines owned by the projectors. The road is to extend from Marion southeast to the headwaters of Staley's Creek, and thence to Rye Valley, the total length of the line as projected being 56 miles. Preliminary surveys have been made. Marion is on the main line of the Norfolk & Western, in Smyth County, east of Bristol. The road will pass through one of the richest mineral sections of Virginia, which is at present inaccessible on account of lack of railroad facilities. W. C. Foster, 52 Broadway, New York City, is Chief Engineer.

**Memphis & Atlantic.**—F. M. Abbott, of West Point, Miss., President of this road, is one of the projectors of a company which is now being organized for the purpose of executing a contract to build a standard gauge railroad from deep water on the Warrior River, near Tuscaloosa, Ala., to what is known as the Maxwell Coal Seam, a distance of about 17 miles. Work will be commenced in February next and completed in the early summer following.

**Northern Pacific.**—The new second track between Tacoma and Puyallup, Wash., nine miles, has recently been put into operation to relieve the pressure from the numerous freight trains on that part of the Cascade Division of the road. A large cut has delayed the opening of the new track its entire length, though it has been completed for some time, except at this cut.

**Ohio River.**—The bridge over the Guyandotte River, which is to form part of the new line into Huntington, W. Va., its southern terminus, will soon be ready for the superstructure. The masonry has been completed by A. H. Stanley & Co., and the contractors are now at work on the approaches. The trestle work is under contract also and it is expected that it will be pushed vigorously to completion early in the spring. The new line to Huntington will be eight miles long altogether, as already stated, and the new station will also be used by the trains of the Newport News & Mississippi Valley Co.

**Pennsylvania.**—President Roberts outlined in an interview in the Philadelphia Press last week, some of the improvements planned for this year, and in anticipation of the World's Fair traffic. He said: "We have authorized up to the present time the expenditure of about \$1,250,000 for the lines west of Pittsburgh. This money is to be used for additional tracks, for passenger cars and locomotives. This is as far as we have gone now, but I suppose something more will be done later on. The Pittsburgh, Fort Wayne & Chicago road will build a number of long sidings, and about 30 miles of new double track. East of Pittsburgh we have done nothing more than to authorize our locomotive shops to be put to their full capacity, in order to enable us to

build about 100 locomotives. We have already ordered 50 engines. We generally have constructed from 75 to 100 locomotives a year. With our new shops at Altoona and the Western shops in good condition, I believe we will be able to make all our repairs and build our own locomotives. East of Pittsburgh we have not yet taken up the question of passenger cars, but we will probably add 150 new ones to our present equipment. We will make material additions to third and fourth tracks, and revise the grades and alignment of the Harrisburg & Mt. Joy road, and reduce the curvature. To do this we will spend about \$500,000. About the middle of January we will open the new Trenton branch from Glen Loch to Morrisville, Pa. We would have had this road opened long ago but for the delay of the connections being made at Glen Loch. These connections are so constructed that all the out-bound trains pass over the inbound ones, avoiding cross over switches. Similar connections are being made at Morrisville. These improvements will cost \$150,000. We could have made the usual connection for \$5,000, but this plan was adopted to do away with the grade crossing. The expenditure on the Trenton cut-off will exceed \$4,000,000, but it was a necessity, and it was made for the purpose of relieving the main line from Downingtown to Philadelphia, and the New York Division from Philadelphia to Trenton, of all through freight service distanced to points east of Trenton. The bridge across the Delaware River near Trenton will be widened to accommodate four tracks, and there will be a four-track road through Trenton. The old station is now removed, thus there will be no delay in freight trains passing through Trenton. As to the enlargement of the Broad Street station in Philadelphia: Work of demolishing the houses on Market street from Broad to Fifteenth, will shortly begin. These buildings will be torn down, and if we can get the plans prepared we will begin to build. Our movement of cars now is greater than it ever has been in the annals of this company. The immense business is being moved without any delay at points east of Pittsburgh, and there is no unusual accumulation of cars except at Baltimore. The business is good and I think it will be better."

Track is now being laid on the Cambria & Clearfield road, which is being built through Cambria County, Pa., from Kaylor Station, on the Ebensburg & Cresson Railroad, about seven miles north of Cresson, Pa. The road will connect at Brubaker Junction with the Cush Creek Division, which connects with the Pennsylvania North-western road at La Jose. The new portion of the road from Kaylor to Brubaker will be about 20 miles in length, and it is expected to have the tracklaying completed by the middle of January. When this branch road is finished and in operation it will give the Pennsylvania a direct road connecting with the Cush Creek mines and those of the Sterling and Brubaker Coal Companies around Hastings. From a point about six miles east of Kaylor another line is being rapidly graded. It will cross the main divide of the Allegheny Mountains at Carrollton, at which point a tunnel about 1,000 ft. long will be excavated. About one-third of the tunnel is under way. From here this extension drops directly into the headwaters of the Susquehanna River, and then it will pass through large deposits of bituminous coal between Carrollton and Cherry Tree. At this point the line is being rapidly constructed to Cush Creek across to Fleming Summit in Indiana County. The road has been surveyed and a large force of men is now grading. Fleming Summit is the lowest pass in the Allegheny Mountains, it having an elevation of less than 1,000 ft. above tide. It is the further intention of the Pennsylvania Railroad to have lines all through this region, and to connect all lines which are now being operated in it. The company now has surveys out locating a line from Burnside to connect with the Cush Creek branch via Gettysburg and Painters Run.

The recent purchase by the company of the Pittsburgh, Chartiers & Youghiogheny is said to have determined the company to build a new line to Sewickley, Pa., to extend to Essen, in Washington County, and from there to Peter's Creek and the Monongahela River, up Lovedale Hollow, near Elizabeth, thence to Sewickley, on the Youghiogheny River, where it meets the Sewickley branch from Irwin.

Contracts were let this week for double tracking a portion of the Mt. Joy track. This work includes the double track from Dillerville to Landisville, Pa., and from Conewago to Branch Intersection, Pa., a total distance of about eight miles.

The following are the more important additions made during 1891 to the mileage of the system east of Pittsburgh. It is impossible to give a statement of the increase in length of tracks for the year until about the last of January, when the material is compiled. There may be several branches extended less than a mile, of which there is now no definite information in the Chief Engineer's office. (1) Trenton Cut-off from Glen Loch, Pa., on Philadelphia Division, to Morrisville, Pa., opposite Trenton, N. J., 45 miles; (2) Muddy Run Branch, Tyrone & Clearfield road, from its connection with Madeira Branch, 30.7 miles from Tyrone, Pa., to its terminus on the Muddy Run, 3.7 miles; (3) Mapleton Branch No. 3, Tyrone & Clearfield road, from Junction 22.2 miles from Tyrone to Columbia Colliery No. 5, 0.8 mile; (4) South Fork Railroad, South Fork Station, on Pittsburgh Division of Pennsylvania Railroad Division, to Dunlo, 7.9 miles; (5) Turtle Creek Valley road, Stewart, on Pittsburgh Division Pennsylvania Railroad, to Murfreesville, Pa., 6.5 miles; (6) McKeesport & Bessemer, Cochran Station, on Pittsburgh, Virginia & Charleston, to McKeesport, Pa., 1.54 miles; (7) Quinton Branch, West Jersey road, Alloway, N. J., to Quinton, N. J., 4.2 miles.

**Philadelphia & Reading.**—The company is now operating the Tamaqua, Hazleton & Northern, which has been built this fall from near Lofty, north to connect with Cox Bros. road, the Drifton, Susquehanna & Schuylkill, at Hazleton, Pa. The road is a little over 9½ miles long. The first shipment of coal over the new line was made Jan. 1. This connection opens a new territory to the Reading, which is likely to prove a valuable feeder in a few months. It is probable that a passenger service will also be established between the Reading and Hazleton regions by spring. The contract work was done by Nolan Bros., of Reading, Pa.

The line of the Tamaqua, Hazleton & Northern Railroad, extending from Hazleton Junction north to Ronan, Pa., nine and nine-tenths miles in length, was opened for business on Dec. 29, 1891. It will be operated as the Hazleton Branch of the Catawissa Division.

**Philadelphia & Reading Terminal.**—The work on the Reading Terminal market house in Philadelphia is so far advanced that by the middle of February it will be ready for occupancy. The brick walls are all up and the Phoenix Iron & Bridge Co. will shortly begin work on the great arch roof trusses over the building. The Pen-



coid Iron Works are about closing up their portion of the contract on the market house and car shed. Opposite, on the north side of Arch street, Contractor Ryan has a number of men clearing the ground preparatory to constructing the foundations for supporting the pillars of the elevated road between Arch and Cherry streets. Along the line of Arch street a wide and deep excavation is being made for the massive stone pier upon which one end of the iron bridge to be thrown over Arch street will rest.

**Quaker City Elevated.**—The sub-committee of Philadelphia Councils' Law Committee has decided to recommend favorably the ordinance granting permission to the company to construct an elevated railroad on Market street, from Front street to Cobb's Creek; on Ninth street, from Market to Ridge avenue, and on Ridge avenue, from Ninth street to Lehigh avenue.

**Ravenswood, Spencer & Glenville.**—The extension beyond Leroy southeast to Spencer was placed in operation Jan. 4. The extension is 16 miles long, making the total length of the line from its connection with the Ohio River Railroad at Ravenswood on the Ohio River below Parkersburg, W. Va., 33 miles. The road has been built this year with the exception of the first seven miles to New Era, and it has been in operation from Ravenswood to Leroy, a distance of 16 miles, since May 15. The grading had been completed at that time as far as Spencer, but the tracklaying has been completed only recently. The new line is practically controlled by the Ohio River road, but it will be operated independently for some time.

**Roanoke, Fincastle & Clifton Forge.**—The 12 miles of the graded road of the Fincastle & Cloverdale line between those towns in Virginia have been transferred to this recently incorporated company, and the rails for that distance will probably be laid by May 1. The road has been chartered to extend from Roanoke, the southern terminus, through Fincastle to Eagle Rock. The length of this line is about 35 miles, and the surveys will be commenced early in the spring. The contract will probably be let to a contractor who will lay the rails on the graded road and build the balance of the line for the company's bonds, or some such arrangement. The work will be largely light grading with some heavy rock cutting. The only iron bridge will be that over the James River, but there will be a number of trestles. C. H. Vines, of Fincastle, Va., is President.

**Shelbyville, Nashville & Northern.**—A preliminary survey has been commenced over the proposed route of this road by T. Ford, President of the company, and a party of surveyors. The proposed route is almost an air line between Nashville and Shelbyville, and passes through a rich agricultural section in Tennessee.

**Southern Pacific.**—The masonry work on the new viaduct across the Pecos River has been practically completed by Ricker, Lee & Co., of Galveston, Tex., and also the construction work on the new road to the river, the construction of the viaduct necessitating the relocation of the line between Comstock and Shumla, Tex. The bridge is about 225 miles west of San Antonio. General Manager Kruttschnitt gives an account of the work in an interview in a New Orleans newspaper.

When the road was built the engineers reported that it was impracticable to cross the Pecos River at any other point owing to the conformation of the country, and so the road was built through the cañons of the Rio Grande. The consequence is a long road that requires constant watching through fear of land slides, beside the power required to convey trains over the ledge, which is about 350 ft. high at the ends and descends to 40 ft. at the point where the mouth of the Pecos is crossed. The engineers have been working on the problem ever since. The surveys finally revealed the natural watershed which has been chosen, and the building of the road was simple, except for the viaduct over Pecos, necessitating one of the highest railway bridges in the world. The advantages to be gained commended the venture to the road at once. In the first place, it shortens the distance by 12½ miles, beside a saving of 380 ft. in grades, and avoids the danger and expense of operating a line through cañons of the Rio Grande. It also throws out large iron bridges in use upon the present line. As already stated, the only difficulty in the new plan was the crossing of the Pecos, which flows at the bottom of a cañon from 300 to 400 ft. in depth. The bridge, or viaduct, will be 328 ft. from the top to the river. The columns of the towers stand upon a ledge 25 ft. high and it is 300 ft. from the rails to the foot of the rock pier. The river is shallow at that point, so that it is only 330 ft. from the bed rock at the bottom of the river to the rail. The Pecos is crossed five miles from its mouth, which is the Mexican boundary line. The bridge proper is 2,180 ft. long. The highest tower is 321 ft. The bases of the towers are 35x100 ft., diminishing to 10x35 ft. at the top. There are 48 spans in all, most of which are iron girders, alternately 35 ft. and 65 ft. long. At the crossing of the river proper there is a cantilever span 185 ft. long. The flooring is about 20 ft. wide, carrying a single line of track, and two footways. Over one-half of the viaduct has been completed. The erection of the iron work began Nov. 1, and has been incessantly pushed forward. It will be completed in three or four months, and possibly earlier. All of the towers are of steel, but the bridge girders themselves are of wrought iron. The Phoenix Bridge Co., of Phoenixville, Pa., has the metal work contract, and Ricker, Lee & Co., of Galveston, the masonry and grading. The latter is finished, and about 75 men are employed on the bridge proper. The tracks approaching the bridge are laid on earth and rock, the rock work predominating. Limestone almost as firm as granite is quarried in the vicinity, and the bridge piers were built of it. The bridge was designed by the bridge and railroad companies jointly. The original plan was for towers all the way. The cantilever disposed of several towers and a great deal of masonry at the bottom of the river. The maximum grade of the new road is where it runs onto the bridge, where there is a 1 per cent. grade. Although in a mountainous country, exposed to cloudbursts, for four miles on each side of the bridge there is not a waterway. The tracks have been laid upon a natural water-shed between two tributaries of the river bed. Beyond the four miles mentioned only a few small pipe culverts constitute the bridging necessary. There is only 600 ft. of bridging upon the entire "cut-off" line of 13½ miles outside of the viaduct, while on the old line there is 2,800 ft. of iron bridging and 3,600 ft. of wooden trestle work.

**South Florida.**—The tracklaying has begun at Pemberton Ferry, Fla., and is making considerable progress north of that town, toward Inverness. The rails already shipped will probably be sufficient to lay the track to that point, where the work may be suspended for the

present. The road has been graded for about this distance, but the balance of the line north to Dunellon, 40 miles from Pemberton Ferry, has only been surveyed.

**Tobique Valley.**—The company expects to open the road for traffic this week as far as it has been completed. Trains can begin running as soon as the rolling stock arrives. The line to be placed in operation extends from Upper Andover on the New Brunswick division of the Canadian Pacific, near the Maine state line, and extends northeast through Victoria County, reaching Red Rapids and Park Rapids, N. B. The completed road is about 14 miles long, and it is intended to extend it to Plaster Rock, 14 miles further, and northeast toward Tobique Lake.

**Transvale.**—This company, recently organized at Macon, Ga., is designed as a suburban railroad extending from within the City of Macon to a point east of the Ocmulgee River. The company has been chartered, but has not yet been fully organized for business. The plans relative to building the line have not been definitely arranged. A. O. Bacon, of Macon, is one of the incorporators.

**Union (Memphis).**—This company is engaged in building a terminal railroad at Memphis, Tenn., to furnish connections for all railroad lines with the new Mississippi River Bridge now in course of construction. Three miles of track were laid in 1891, and arrangements are being made to complete the ten miles early this year. The purpose of the road is to furnish facilities for the railroads centering at Memphis, and connection with industrial enterprises, cotton warehouses and compresses, with a special view of dispensing with the present cumbersome drayage system in the handling of cotton. J. C. Rogers, of Memphis, is President.

**Velasco Terminal.**—Hugh Burns, the contractor who is building the road from Velasco to Chenango, Tex., where it connects with the Columbia branch of the International & Great Northern, states that work on the road had been delayed on account of the failure of the ship with the rails to arrive on time, but now the rails have arrived, and the work will be pushed, and it is expected that tracklaying would be completed in 10 days. The line now building is 22 miles long.

**Washington Shore Line.**—Articles of incorporation of the company have been filed in Washington. The object of the company is to operate a road from the terminal point of the Northern Pacific Railroad, near Tacoma, to a point near Point Defiance, near Port Townsend.

**Withlacoochee & Gulf.**—Articles of incorporation of the company were filed in Florida last week. The company proposes to build a road to be operated in the counties of Pasco, Hernando and Citrus, from a point west of the Withlacoochee River, connecting with the Florida Southern, near Pemberton, through Floral City, in Citrus County, and Tompkinsville, in Citrus County, and to South Dunnellon, the road to be 50 miles long.

#### GENERAL RAILROAD NEWS.

**Atchison, Topeka & Santa Fe.**—The gross earnings, operating expenses (exclusive of taxes and rentals) and net earnings of the road and its auxiliary lines for the month of November, 1891, were as follows:

	Gross earn.	Oper. expen.	Net earn.	Oper. mile.
Roads owned and controlled.....	\$3,126,974	\$2,633,087	\$1,073,287	6,536
Roads jointly owned, Atchison's one-half.....	180,708	139,433	41,275	467
Total, Atchison system.....	\$3,307,682	\$2,772,520	\$1,114,562	7,123
St. Louis & San Francisco:				
Roads owned and controlled.....	\$649,773	\$348,867	\$300,906	1,328
Roads jointly owned, Frisco's one-half.....	177,947	133,582	44,365	536
Total, Frisco system.....	\$827,720	\$482,449	\$345,271	1,864
Aggregate, both systems.....	\$4,135,402	\$3,254,969	\$1,459,833	8,987

The following is a comparative statement of all lines:

	Gross Earn.	Net Earn.	Per Mile.	Gross Earn.	Net Earn.	Per Mile.
Atchison System:						
Nov., 1891.....	\$3,307,682	\$1,114,562	\$161	\$156	7.124	
Nov., 1890.....	3,072,890	786,090	125	110	7.100	
Inc., Nov., 1891.....	\$234,802	\$328,472	\$32	\$46	15	
Frisco System:						
Nov., 1891.....	\$827,720	\$345,271	\$184	\$185	1.864	
Nov., 1890.....	787,702	298,011	125	130	1.855	
Inc., Nov., 1891.....	\$140,018	\$47,260	\$19	\$25	9	
Aggregate General System:						
Nov., 1891.....	\$4,135,402	\$1,459,833	\$161	\$162	8.988	
Nov., 1890.....	3,860,582	1,084,101	125	121	8.965	
Inc., Nov., 1891.....	\$274,820	\$375,732	\$36	\$41	23	

**Austin & Northwestern.**—The company has filed at Austin, Tex., a stockholders' resolution authorizing the issue of first mortgage five per cent. gold bonds, due in 1941, not to exceed \$20,000 for each mile of constructed road. The Atlantic Trust Co., of New York, is the Trustee of the bonds, which are issued partly to complete the Llano extension.

**Boston & Lowell.**—The annual meeting of the stockholders was held in Boston, Jan. 6, and it was voted to authorize the issue of 4,000 shares of new stock for the purpose of paying for improvements made by the lessees, the Boston & Maine.

**Canadian Pacific.**—The Department of the Interior of the Dominion has received from the Chief Solicitor and Secretary of the company a memorandum setting forth the land finally selected by the company in the Northwest under its charter. Over eight million acres of land in various parts of the territories have been selected. If the government accepts the proposition, and the land is transferred to the company, the department will be able to sell a large quantity of government lands now held subject to the railroad's choice.

**Central of Georgia.**—The regular semi-annual dividend of 3½ per cent., due Jan. 1, the first to mature under the lease of the Georgia Pacific or the Richmond & Danville was not paid when due, the Richmond & Danville refusing to carry out its guarantee unless the Central of Georgia deposited bond to cover a claim of \$800,000, which the Danville holds is due it by the Central. It is said that this amount has been paid by the Danville since the lease of the Central, on accounts incurred prior to the lease, and not included in the statements at the time of the transfer and therefore it should be paid by the Central.

**Chattanooga Southern.**—The plan of reorganization recently adopted is said to propose the issue of new bonds at the rate of \$20,000 per mile and take up the old bonds, which are at the rate of \$15,000 a mile. In addition to the new bonds a bonus of two extra shares will go to each stockholder who agrees to the reorganization. If a majority of the stockholders surrender their present bonds and accept the new issue an effort will be made to float the bonds for the proposed extension of the road. The money thus realized will be used in building the line from Gadsden toward Birmingham.

**Chicago, Burlington & Quincy.**—The earnings and expenses of the company for November and the 11 months of the fiscal year are shown in the following statement:

	1891.	1890.	Inc. or dec.
November:			
Gross earnings.....	\$3,541,109	\$2,872,680	I. \$668,429
Oper. expenses.....	2,207,990	1,816,630	I. 391,360
Net earnings.....	\$1,333,119	\$1,056,050	I. \$277,069
Fixed charges.....	800,000	773,515	I. 26,485
Surplus.....	\$533,119	\$282,535	I. \$250,604
Eleven months to Nov. 31:			
Gross earnings.....	\$31,827,896	\$32,314,853	D. \$486,956
Oper. expenses.....	19,726,320	20,914,014	D. 1,187,698
Net earnings.....	\$12,101,576	\$11,400,839	I. \$700,737
Fixed charges.....	8,732,000	8,508,671	I. 223,328
Surplus.....	\$3,369,576	\$2,892,168	I. \$477,408

The sum applicable for dividends out of the earnings for the eleven months is \$3,349,570, and the dividends already declared, three of 1 per cent. and one of 1½ per cent., amount to about \$3,246,700, leaving a surplus of \$102,870.

**Chicago, Milwaukee & St. Paul.**—The November statement of earnings is as follows:

	1891.	1890.	Increase.
November:			
Gross earn.....	\$3,214,162	\$2,659,985	\$554,177
Oper. expense and taxes.....	1,909,867	1,593,036	316,831
Net earnings.....	\$1,304,294	\$1,067,947	\$236,348
Five months ending Nov. 31:			
Gross earn.....	\$14,466,565	\$12,743,140	\$1,723,425
Op. expense and taxes.....	8,774,583	8,068,845	705,738
Net earn.....	\$5,691,982	\$4,674,295	\$1,017,687

**Cincinnati, Dayton & Ironton.**—Messrs. Kessler & Co., of New York, offer at 97 and accrued interest \$1,500,000 five per cent. first mortgage 50 year gold bonds of the railroad, being the unpaid balance of a total issue of \$3,500,000. The road has been leased by the Cincinnati, Hamilton & Dayton Railroad Co., which guarantees principal and interest. The railroad is already more than earning the total interest upon its bonds.

**Cleveland, Cincinnati, Chicago & St. Louis.**—The following is the statement for earnings for November and the five months to Dec. 1.

	1891.	1890.	Inc. or dec.
Month of November:			
Gross earnings.....	\$1,167,776	\$1,160,883	D. \$6,893
Operating expenses.....	808,231	820,013	D. 11,782
Net earnings.....	\$359,545	\$340,870	I. \$18,675
Fixed charges.....	217,112	218,229	D. 1,117
Surplus.....	\$142,433	\$122,641	I. \$19,792
Five months to Dec. 1:			
Gross earnings.....	\$6,036,469	\$5,703,319	I. \$333,150
Operating expenses.....	4,168,038	3,928,554	I. 239,484
Net earnings.....	\$1,868,431	\$1,774,765	I. \$93,666
Fixed charges.....	1,070,033	1,078,442	D. 8,409
Surplus.....	\$798,398	\$696,323	I. \$102,075

**East Florida & Atlanta.**—This short Florida road, in operation between Orlando and Oviedo, Fla., 10 miles, has been purchased by the Florida Central & Peninsula, and is now being operated by that company.

**Lehigh Valley.**—The company has sold \$7,000,000 of its New Jersey Terminal Railroad five per cent. bonds out of the \$10,000,000 authorized by the mortgage. The bonds have not been offered for public subscription, but Drexel, Morgan & Co. have sold part of the issue to financial institutions at a price said to be 105. In Philadelphia the bonds now sell on the Stock Exchange for 107½.

**Louisville & Nashville.**—The following is the November statement of earnings:

	1891.	1890.	Inc.
November:			
Gross earnings.....	\$1,821,043	\$1,675,706	\$145,337
Oper. expen.....	1,191,358	1,061,932	129,426
Net earnings.....	\$629,685	\$613,814	\$15,871
Five months July to Nov. 30:			
Gross earnings.....	\$9,270,022	\$8,389,557	\$880,465
Oper. expen.....	5,883,451	5,214,776	668,675
Net earnings.....	\$3,386,571	\$3,174,781	\$211,790

**Montreal & Sorel.**—Trains have been discontinued on this road, which for a long time has been operated spasmodically. This cuts off the whole district south of the St. Lawrence River from Montreal, and it is particularly inconvenient since the ferries have been closed.

**New Brunswick.**—The annual meeting of the stockholders was held last week, and it was formally decided to accept the terms by which the St. John & Maine Railroad, formerly leased, was purchased, and also to confirm the agreement with the Fredericton Railroad.

**New York Central & Hudson River.**—The following table shows the earnings of the company for the quarter ending Dec. 31, 1891, and for the six months, July 1 to Dec. 31, compared with the corresponding periods of 1890. The operations of the Rome, Watertown and Ogdensburg are included in the 1891 figures:

	1891.	1890.	Increase.
Oct. 1 to Dec. 31:			
Gross earnings.....	\$12,364,651	\$9,462,456	\$2,902,195
Oper. expenses.....	8,249,448	6,228,984	2,020,464
Net earnings.....	\$4,115,203	\$3,233,472	\$881,731
Fixed charges.....	2,465,446	2,114,400	351,046
Profit.....	\$1,649,757	\$1,119,072	\$530,685
Dividend.....	1,117,884	894,283	223,601
Surplus.....	\$531,873	\$224,789	\$307,084
July 1 to Dec. 31:			
Gross earnings.....	\$24,152,638	\$18,326,091	\$5,826,547
Oper. expenses.....	15,906,450	12,523,504	3,382,946
Net earnings.....	\$8,246,188	\$5,802,587	\$2,443,601
Fixed charges.....	4,932,570	4,106,400	826,170
Profit.....	\$3,313,618	\$1,696,187	\$1,617,431
Dividend.....	2,385,707	1,788,586	597,121
Surplus.....	\$1,027,911	\$907,601	\$120,310



The gross earnings for December, 1891, were \$4,050,980, including \$333,351 earnings of the Rome, Watertown & Ogdensburg. The earnings in December, 1890, were \$3,083,956, the increase in 1891 being \$967,024. The earnings for the quarter ending Dec. 31 were \$12,265,630, and for the six months, \$24,153,618, being an increase over 1890 of \$2,803,174 and \$5,626,927, respectively. The 1891 figures include Rome, Watertown & Ogdensburg earnings of \$1,005,460 for the three months and \$2,091,549 for the six months.

**Northern Pacific.**—A decision was given by the United States Supreme Court, this week, in favor of the company in the mandamus suit brought against it by the Territory of Washington, to compel the company to maintain a station and stop its trains at Yakima City, the company having built a town of its own at North Yakima, and refusing to stop trains at Yakima City.

**Oregon & Washington Territory.**—The appointment of a Receiver as noted last week, was on the application of Charles B. Wright, of Philadelphia, in the United States District Court for Oregon. These lines are known as the Hunt system, and they were purchased by Mr. Wright, who now practically owns the property in his own right. The mileage of the system is about 170 miles, and the road extends through the wheat fields of the Walla and Snake River Valleys in Eastern Washington and Oregon. Mr. Wright's object in placing the lines in a Receiver's hands is to reorganize the system under one mortgage instead of three, which are now in existence. The system, after reorganization, will have a new name.

**Philadelphia & Seashore.**—The decree for the foreclosure sale of this road was issued by the Chancery Court of New Jersey last week. The sale is to be held at Camden, N. J., Jan. 19. The company was organized about two years ago to build a road to Atlantic City, N. J., so that the Philadelphia & Reading could run through trains from Philadelphia to that point. The road has been built from Winslow Junction southeast to Sea Isle City, and a branch called the Tuckahoe & Cape May City has been partly built from a point west of Sea Isle City south toward Cape May City. The lines have never been completed nor the part built put in operation, on account of a nearly endless litigation between contending parties of stockholders for the control of the road. Both roads are in the control of receivers, Philip P. Baker holding that position on the Philadelphia & Seashore, and W. P. Wilson on the branch road.

**Richmond & West Point Terminal.**—The guarantee syndicate which Gen. Thomas and his friends started to form for the purpose of protecting the floating debt of the Richmond & Danville, pending the completion of the permanent plan for the reconstruction of Richmond Terminal finances, was completed this week. The amount needed to cover the possible demands of the Danville's creditors was \$5,000,000, and the amount is said to have been over-subscribed. The loan is to be for six months and the advances are to be secured by the same collateral as that on which the floating debt is now carried. The signers of the guarantee receive the privilege of subscribing in proportionate amounts to any plan for raising funds under the programme which the Olcott committee of Terminal shareholders may devise. The Olcott committee has not yet submitted its reorganization scheme, but one of the projects discussed has been the conversion of the Richmond Terminal Company from a corporation merely intended to hold securities to one which may practically operate railroads. A new company might be organized which could directly operate the Richmond & Danville system, holding in its treasury for control the stocks of the East Tennessee, Virginia & Georgia, and the Central Railroad of Georgia.

The Olcott Stockholders' committee has asked the stockholders to send proxies, to be voted by the committee at such meetings as it might see fit to call, on the condition that said proxies should be revocable at the will of the maker, and that they shall not be voted except on questions that have been duly published.

**St. Joseph & Grand Island.**—A new agreement has been made with the Union Pacific, supplemental to that of July 1, 1885, by the second mortgage bondholders of the road, providing that the Union Pacific shall fully and fairly perform the agreement of July 1, 1885, and the St. Joseph & Grand Island shall be conducted under an independent management, so far as possible under said agreement, and not in hostility to, but in harmony with the Union Pacific. The latter will at once pay off the coupons of the second mortgage bonds due July 1, 1890. The rights of the second mortgage bondholders to future earnings are clearly defined. The Union Pacific Company, under the agreement of 1885, will now deposit \$35,000 each month with the Central Trust Co., of New York, to meet interest on the first mortgage bonds. The new agreement is not intended to impair in any way the contract relations already existing between the two companies. The particular point of the agreement is that it provides that the traffic relations between the companies shall not make the St. Joseph & Grand Island responsible for more than one-half the interest on the first mortgage bonds of the Kansas City & Omaha road. In case the latter company earns the interest on its first mortgage bonds all the surplus earnings of the St. Joseph & Grand Island are secured to it. The company owns over \$1,800,000 of the capital stock of the Kansas City & Omaha.

**St. Paul & Duluth.**—Trains on the short line between Duluth and West Superior, Wis., are not now run, and the stations at Oneota, Hazlewood, West End and others have been abandoned.

**San Pete Valley.**—The Union Pacific has practically discontinued the operation of trains on this narrow gauge line, which it has controlled for several months. The road extends from Nephi, Utah, on the former Utah Central road, southeast to Chester, 30 miles, through the Sevier Valley.

## TRAFFIC.

### Chicago Traffic Matters.

CHICAGO, Jan. 6, 1892.

Most of the eastern roads are again open for the receipt of export grain and the freight blockade west of here and in the city is beginning to be lifted. It will, however, probably require the greater part of January to move the grain now on track and in sight, which is likely to continue the scarcity of cars for some weeks later than this.

The regular quarterly meeting of the Advisory Board of the Western Traffic Association will be held at the Windsor Hotel, New York, commencing next Tuesday,

Jan. 12, and it is probable that a large number of important matters will be considered, there having been no meeting since July last. The election of officers takes place at this meeting.

The Central Traffic Association lines have amended their rules to provide that freight delivered to association roads within ten days after a change in rates, if actually shipped, consigned at through rates direct to points in the east, prior to the date of change, and loaded before such date, may go forward at the old rate; way bills to bear notation accordingly.

Chairman Finley has fined the Chicago, St. Paul, Minneapolis & Omaha \$100 for malicious prosecution in preferring charges against the Chicago, Milwaukee & St. Paul. The decision and fine grows out of a complaint made by the Omaha line against the St. Paul for violation of the agreement of the Western Passenger Association by its connection, the St. Paul & Duluth, in selling three tickets from Duluth to Chicago with an excessive limit of one day, thus allowing a scalp at St. Paul. The St. Paul road entered a counter charge of malicious prosecution. The chairman finds the charge of the St. Paul to be sustained. The agent of the Omaha purchased one of the tickets in question at Duluth, brought it to St. Paul and exhibited it; he then sold it to a broker there, repurchased it on the same day from the broker, and then filed a notice of violation of agreement. No alteration was made in the ticket after it was first purchased. The charges against the St. Paul are dismissed because they were not filed at the general offices in Chicago as required by the agreement.

Chairman Midgley has given lines in the Western Freight Association authority to meet the rate of \$10 per net ton made by the Union Pacific on copper matte from Montana common points to St. Louis and Chicago, by accepting \$2 from the Missouri River on this traffic; the rate to the Missouri River being \$8. The chairman having in mind the pending dispute between the Union Pacific-Northwestern line and the other lines east of the Missouri River, announces, in connection with the authorization of this rate, that any road east of the Missouri River participating in the business on this basis will do so without prejudice to prior claims it may have or assert for a different adjustment via Council Bluffs.

The arbitrators, Messrs. De Haven, Fee and Mahoney, to whom was referred the appeal of the Chicago, St. Paul & Kansas City with respect to a decision of Chairman Finley, have sustained the chairman, and hold that the agreement of the Western Passenger Association confers upon the chairman the right to adopt such means as he may elect to determine the facts with respect to a complaint of the misuse of any class of tickets in violation of the agreement, provided the original presentation raises a fair presumption that the complaint is well founded, and the complainant requests him to personally conduct the investigation.

An appeal was recently taken from the Western Freight Association to the Commissioners of the Western Traffic Association upon request of a member to be allowed to apply packing house product rates to lard oil from Cedar Rapids to the Mississippi River on traffic destined to points east of the Indiana-Illinois state line. A decision has now been promulgated by the Commissioners in which they decline to authorize the rate. Their decision, which is of more than passing interest in view of the position taken against the further extension of commodity rates, is as follows:

"While no objection was presented on the part of any of the lines directly interested in the traffic in question to the proposition above stated, nevertheless the arguments presented by the various lines have not been sufficient to convince the Commissioners that the proposed change should be authorized. The application made in the Western Freight Association proposed that the oil in question should be subject to the rate which governs on shipments of packing house products. There are many objections to this proposition. Illuminating and lubricating oils are the subject of classification and are not exceptionally created. To introduce the exception thus proposed would be the signal for a general attack upon the classification in respect to many corresponding articles and at innumerable points. It would hardly be practicable to enlarge the list of articles included under the title 'Packing house products' for the benefit of a single packer, or to confine such a change to a single point. The obvious result would be in the way of this method of treating the subject are so serious that the application was changed at the hearing into a suggestion that a special commodity rate on the article in question be made, by which lard oil should receive a rate approximating the rate in force upon packing house products from Cedar Rapids to the Mississippi River, when destined east of the State of Illinois. But while the carriers directly interested in the particular traffic in question express themselves as willing to submit to the reduction proposed, the Commissioners cannot authorize it without considering the effect likely to follow in respect to other commodities and at other localities. The introduction of a special rate of this kind is exceedingly easy, and is often of great advantage to some industry or locality, but is almost inevitably followed by complaints of discrimination from other localities, or in respect to corresponding articles, which in the present case would be difficult to answer. The natural consequence of the action proposed would be likely to give rise to serious trouble at no very distant date; and as the Commissioners do not feel that the proposed rate could be safely made without disturbing other points and other articles, they find themselves compelled to decline to allow a special rate for this commodity."

### Traffic Notes.

A Car Service Association has been established at Nashville, Tenn.

The landing place for immigrants from Europe at New York City has been changed from Castle Garden to Ellis Island, and the local papers report new difficulties and contentions between the passenger agents of the rival trunk line roads.

The Toledo, St. Louis & Kansas City has given the requisite thirty days' notice of withdrawal from the joint agreement made between the Trunk Lines and Central Traffic Association roads one year ago, for the government of business within joint territory.

A bill has been introduced in the New York State Legislature requiring through passengers over the Manhattan and the Suburban Rapid transit elevated roads in New York to be carried for a single five cent fare, the revenue to be divided between the roads "in proportion to the mileage of each of said roads within the city of New York."

The Delaware, Lackawanna & Western has issued a circular announcing that tickets issued by or reading over the Chicago & Alton will be accepted by the company hereafter, and that the relations existing prior to April 14, 1891, are restored. The Baltimore & Ohio and the Buffalo, Rochester & Pittsburgh have taken similar action, so that the Pennsylvania, the New York Central and the West Shore are now the only trunk lines that maintain the "boycott."

The passenger agents of the roads between Buffalo and New York have been trying to put a stop to the demoralization in eastbound rates from Buffalo, and it is said that they have come to an agreement. It appears that the brokers have for a long time been selling tickets

to New York at \$1.50, \$2.50, and even more, below tariff rates. A meeting of the Trunk Line Executive Committee will be held in about ten days, and an agreement for a division of traffic will then be discussed. The proposition is to equalize differences by diversion of westbound emigrant business.

### Lawfulness of Demurrage Charges.

One of the latest decisions on the demurrage question is that of the Supreme Court of Georgia in the case of Miller & Co. against the Georgia Railroad. As this decision touches upon some details of the question not heretofore covered by legal rulings, we quote the main points as published:

1. It is competent for a common carrier whose customers at their option have the privilege of unloading for themselves the vehicles in which their freights are shipped to adopt and enforce a regulation as to the time within which the vehicles may be unloaded free of any expense for storage, and to fix a reasonable rate per day at which storage will hereafter be charged for the use of such vehicles so long as they remain loaded.

2. A rate of \$1 per day for each railroad car thus devoted to the use of storing freight is not necessarily unreasonable because cars are of different sizes and vary in capacity, nor because a fraction of a day is charged for a whole day, nor because the customary rate of storage in warehouse or elevator is much lower nor is it, as a matter of law, unreasonable for any cause.

3. A particular common carrier, though a corporation, makes a regulation of its own by adopting and acting upon it, irrespective of the source from whence it is derived, and, therefore, that it was promulgated by a person or board of persons representing a combination of such carriers would make no difference.

4. As between the carriers and customers who have notice of the regulation before shipments are made the regulation is operative, whether indicated upon bills of lading or not, or whether the shipments are made to the order of the consignor with the customary direction to notify the customer, or directly to the customer himself.

5. In constructing the phraseology of a regulation expressed in this language: "It being understood that this car or cars are to be placed and remain accessible to the consignee for the purpose of unloading during the period in which held for demurrage, and that when the period of such demurrage charges commence, they are to remain accessible to the consignee for unloading purposes," the course and exigencies of business are necessarily to be regarded; and hence the cars, after arrival at destination, though not kept accessible at every moment of time, are to be treated as being and remaining accessible if the carrier is always ready to render them so within the shortest practicable time, not longer than a few hours, after being notified that the customer is ready to unload.

### Interstate Commerce Commission.

#### DECISION AS TO FREE PASSES.

The Commission has announced its decision in the case against the Boston & Maine concerning free transportation. The company in its answer stated that it was in the habit of giving passes to the following classes of persons:

- 1—Sick, necessitous or indigent persons.
- 2—Gentlemen like James W. Bradbury, long eminent in the public service.
- 3—Proprietors of summer hotels and large boarding houses.
- 4—Wives and other members of employes' families.
- 5—Agents of ice companies and milk contractors, doing business on the line of the railroad extending between any two States.
- 6—The higher officers of Maine, New Hampshire, Vermont and Massachusetts, and certain prominent officers of the United States.
- 7—The Railroad Commissioners of Maine, New Hampshire, Vermont and Massachusetts.
- 8—The members of the railroad committees of the Legislatures of Maine, New Hampshire, Vermont and Massachusetts.
- 9—Trustees under mortgages on the property of the incorporation entitled to inspect its property.
- 10—"Complimentary" persons whose good-will is important to the corporation and who, so long as the general practice of railroads remains what it now is, might justly take offense if they received from the Boston & Maine different treatment from that received from other railroads.

This statement imposed upon the Commission the duty of giving construction to the law in respect to the right of a road to give interstate passes. The opinion holds that where the service of the carrier is "like and contemporaneous" the charge to one of a greater or less compensation than to another is unjust discrimination and unlawful, unless allowed under the exceptions in Section 22; and the traffic is not rendered dissimilar by the fact that passengers hold unlike or unequal official, social or business places. This would exclude the right to give interstate passes to "gentlemen eminent in the public service," "higher officers" of States, "prominent officers of the United States," members of railroad legislative committees and "persons whose good will is important to the corporation." Some passes, though in form free, were free only in name, because in reality there was some consideration for them, such as those issued in exchange for advertising, to hotel proprietors, ice dealers and milk dealers. As to these classes the Commission concluded to hold the case for further investigation and in the meantime to issue an order applicable to classes 2, 6, 8, and 10 in accordance with the construction of the law as set forth.

### Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Dec. 31 amounted to 134,676 tons, against 82,743 tons during the preceding week, an increase of 51,933 tons, and against 77,397 tons during the corresponding week of 1890, an increase of 57,279 tons. The proportions carried by each road were:

	Wk. to Jan. 2.		Wk. to Dec. 26.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	17,710	13.3	12,206	14.7
Wabash.....	6,715	5.1	3,882	4.7
Lake Shore & Michigan South.....	25,824	20.0	51,437	18.7
Pitts., Ft. Wayne & Chicago.....	22,360	18.7	14,864	18.0
Pitts., Cin., Chicago & St. L.....	11,635	8.3	7,705	9.1
Baltimore & Ohio.....	9,301	7.1	4,325	5.9
Chicago & Grand Trunk.....	15,895	11.2	8,203	9.9
New York, Chic. & St. Louis.....	12,557	9.1	7,033	8.5
Chicago & Erie.....	12,279	9.2	8,710	10.5
Total.....	134,676	100.0	82,743	100.0

Of the above shipments 19,493 tons were flour, 75,006 tons grain, 8,000 tons millstuffs, 6,210 tons cured meats, 8,190 tons dressed beef, 1,770 tons hides and 3,973 tons lumber. The three Vanderbilt lines carried 42.4 per cent. of all the business, and the two Pennsylvania lines 35.0 per cent.



GEO. WESTINGHOUSE, JR.,  
President.T. W. WELSH,  
Supt.JOHN CALDWELL,  
Treasurer.W. W. CARD,  
Secretary.H. H. WESTINGHOUSE,  
General Manager.

# THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

## WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 22,000 engines and 270,000 cars. This includes (with plain brakes) 180,000 freight cars, which is about 18 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 120,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.		Grand total.
1881	105	■	105
1882	1,085	■	1,190
1883	4,966	■	6,156
1884	15,051	■	21,207
1885	10,410	■	31,617
1886	8,946	■	40,563
1887	9,281	■	49,844
1888	27,696	■	77,540
1889	26,065	■	103,605
1890	50,502	■	154,107

154,107 freight cars fitted with the Westinghouse Automatic Brake, which is more than 15 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager.

JOHN B. GRAY, Agent.

C. C. HIGHAM, General Supt.

### THE AMERICAN BRAKE COMPANY.

NEW YORK OFFICE,

THE WESTINGHOUSE AIR BRAKE CO., Lessee,

CHICAGO OFFICE,

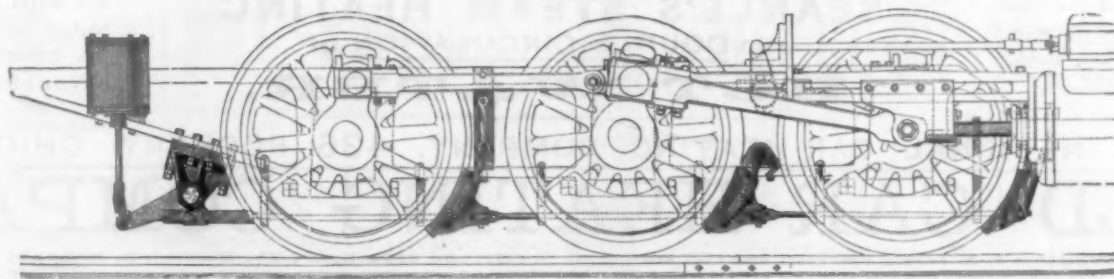
160 Broadway, JOHN B. GRAY, Agent.

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Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.



BRAKE



SHOES

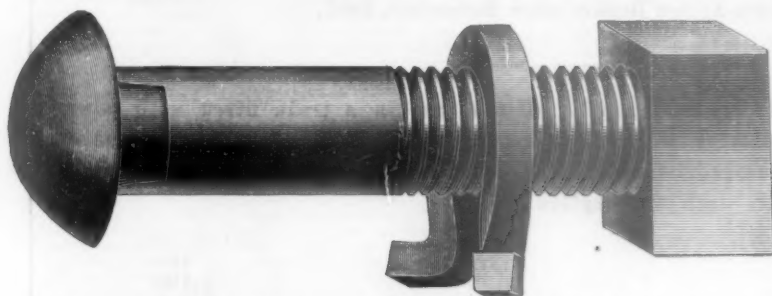


CONGDON

Licensees of the **CONSOLIDATED BRAKE SHOE CO.,**FOR OHIO AND WESTERN STATES: **THE CONGDON BRAKE SHOE CO.,** Phenix Building, Chicago, Ill.FOR OHIO AND EASTERN STATES: (CONGDON SHOES) **RAMAPO WHEEL & FOUNDRY CO.,** Ramapo, New York.FOR OHIO AND EASTERN STATES: (FLANGE SHOES) **RAMAPO IRON WORKS,** Hillburn, New York.FOR SOUTHERN STATES: **THE ROSS-MEEHAN BRAKE SHOE FOUNDRY CO.,** Chattanooga, Tenn.

Shoes should be ordered in accordance with the above allotment of territory.

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Manufactured under D. O. Ward's Patents by the

**STANDARD NUT LOCK CO.,**

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously: rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down thread of bolt.

The nut lock for  $\frac{3}{4}$  bolt made of  $\frac{1}{4}$  in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bar on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e., the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in inwardly curved extensions, which must apparently furnish additional short leverage spring force of a torsional character.

**Its Inclusive Merits of the "Standard" Nut Lock, Condensed:**

Fixes in position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard is interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

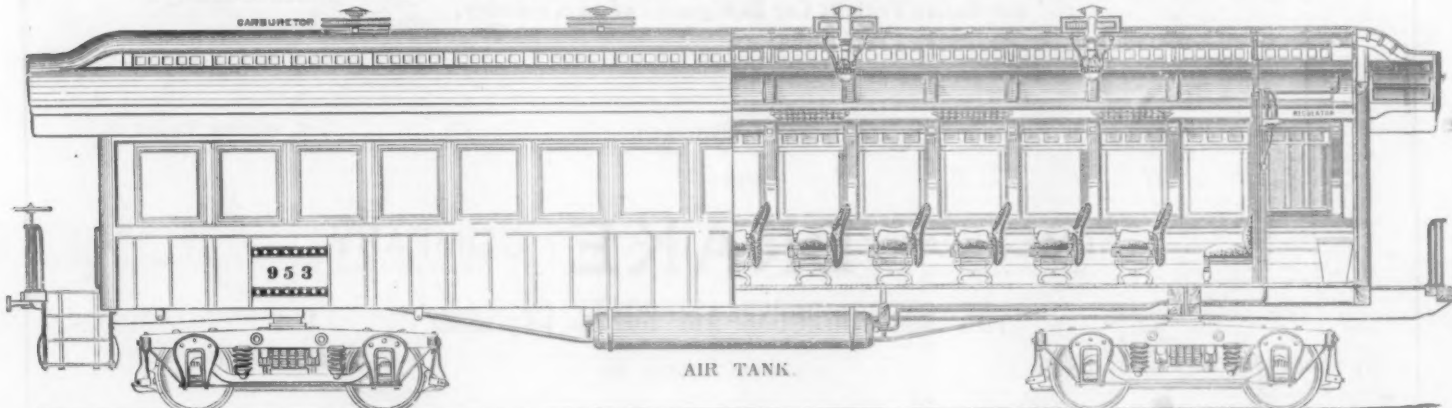
Being fixed in position it offers double the locking friction of nut locks, which when in their "dead" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

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The Greatest Light of the Age.

Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.



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A Practical Method Produced.  
Easily Handled by Train Men.  
Controlled by a Single Valve.  
Meets Every Requirement.

**SEARLE'S STEAM HEATING**  
AND **DOUBLE CIRCULATION OF**  
**HOT WATER.**

Any Water Circulating  
System Can be Utilized.  
The **CONDENSED STEAM**  
AUTOMATICALLY Removed.

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Gold's INTERCHANGEABLE, with Gravity Relief Trap.

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" WESTINGHOUSE TYPE,

" to couple with SEWEL.

" GIBBS.

We Own the Sole Rights under United States Patents to put Traps on Steam Couplings.

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ECONOMICAL AND RAPID CIRCULATION.  
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THE BEST, MOST ECONOMICAL AND ONLY SAFE LIGHT FOR RAILROAD PURPOSES.  
IN BRILLIANCY AND CLEANLINESS UNSURPASSED.  
THIS SYSTEM HAS BEEN ADOPTED BY THE U. S. LIGHT-HOUSE BOARD FOR LIGHTING BUOYS.

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## STEAM COUPLERS

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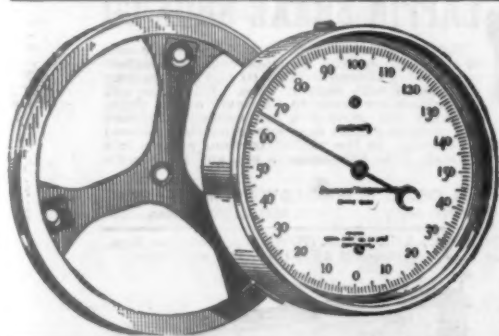
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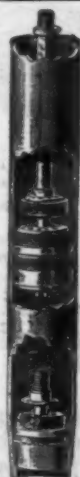
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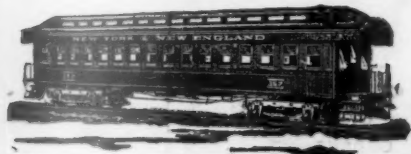
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This Curved Safety R. R. Spike Has the Only True Principles for a Spike and Will Always Do the Work.



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ORDERS SOLICITED FROM ALL RAILROADS.

AGENTS WANTED TO INTRODUCE IT.

All Spike Manufacturers will be allowed to make them conditionally.

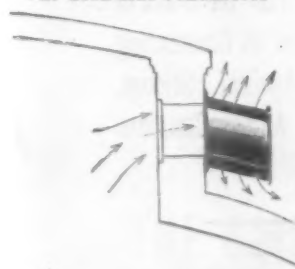
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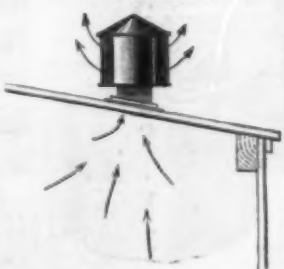
Strong exhausts from the impinge of the outside air, and ABSOLUTELY ANTI-INGRESS.

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New, Neat, Noiseless, Simple, and Scientific.



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LOCOMOTIVE BRAKES,

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The Only Brake that can Cover All the Wheels of a Locomotive, including the  
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TESTS OF THE BEALS ENGINE BRAKE

COMPARISON WITH		
Test of American Pull Brake (best results obtained at Burlington)	operated by Westinghouse	
Automatic Air on Consolidation Engine:	Speed.	Distance to stop (feet)
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American Pull Brake (Consolidation Engine).....	30	276
Beals Engine Brake (Ten-wheeled Engine).....	30	167

DIFFERENCE IN FAVOR OF BEALS BRAKE.....109 FT

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INSPECTION HAND CARS.

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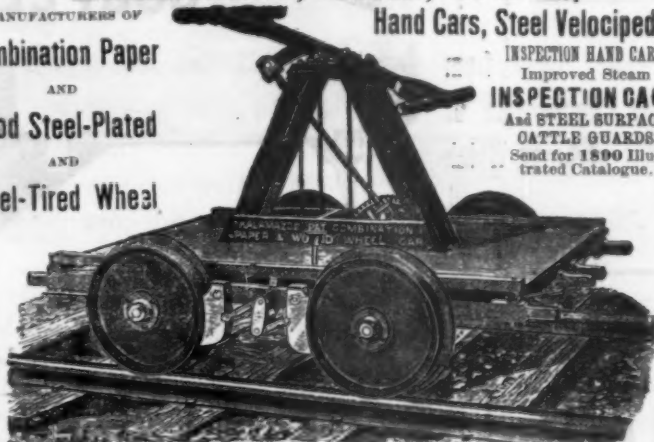
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Wood-Wheel Hand and Push

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WITH ROLLED STEEL TIRE.

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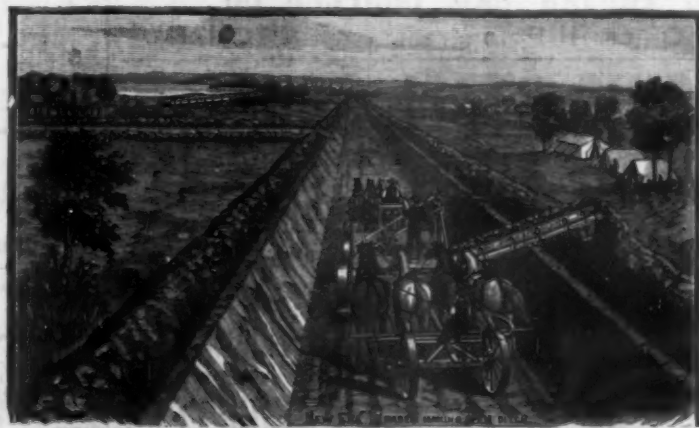
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Excavates canals at a cost of 2 cents per cubic yard, moving 1,000 to 1,500 cubic yards in 10 hours with six teams and three men. Will make a canal 80 feet wide and 8 feet deep. Builds, removes and cuts down hills by loading 600 to 800 wagons of 1 1/2 yards each in 10 hours at 2 1/2 cents each. Builds railroad embankments or country turnpikes for one-quarter the cost of any other appliance. We also make the Austin-Reversible Road Machine, Buck Scrapers, Wheel and Drag Scrapers, Contractors' Plows, and Street Sweepers. Send for catalogue.

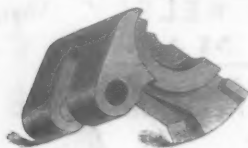
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# STANDARD COUPLER

(DOWLING TYPE.)



Drawhead, Malleable Iron.



Knuckle, Pressed Steel.



Pin, Drop Forged Steel.

THREE PARTS.

With Chain Attachment for Opening  
Knuckle WHEN REQUIRED.

THE STANDARD CAR COUPLING CO., TROY, N. Y.

MAIN OFFICE: 45 Broadway, New York.

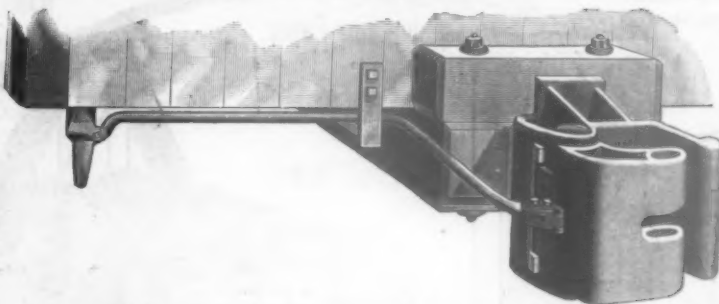
CHICAGO OFFICE: 1018 The Rookery.

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A. C. McCORD, Vice-President.

## DREXEL COUPLER.

M. A. KILVERT, Treasurer.  
D. W. McCORD, Secretary.

Knuckle Is Pulled Open from  
Side of Car by Continuation of  
Same Movement of Lever Which  
Raises the Lock.



Drawbar Cannot Fall on Track in  
Case of Breakage, as Connecting  
Rod Pulls Up Against Stirrup.  
Raises Lock and Allows Couplers  
to Separate.

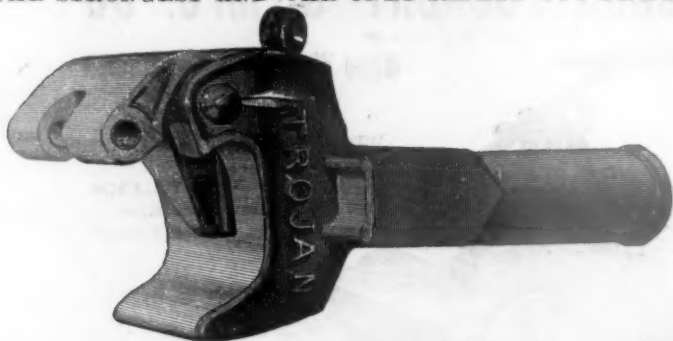
THE ROOKERY, CHICAGO.

H. O. NOURSE, General Agent.

## TROJAN CAR COUPLER.

M. C. B. TYPE.

THE STRONGEST AND THE ONLY SAFETY COUPLER

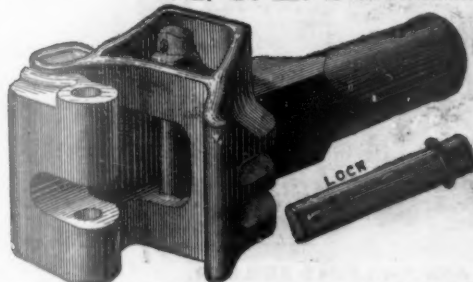


The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.  
The lock has a bearing of four square inches on the knuckle.  
N. O. Olsen, Engineer of Fairbanks & Co.'s testing department, says: "IT IS THE STRONGEST COUPLER NOW IN THE MARKET"

THE TROJAN CAR COUPLER CO.,  
New York Office, 11 Pine street. TROY, N. Y.

## ST. LOUIS STEEL COUPLER,

M. C. B. STANDARD.



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PASSENGER  
COUPLERS

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St. Louis, Mo.  
HENRY O'HARA,  
Vice-Pres. and Treas.

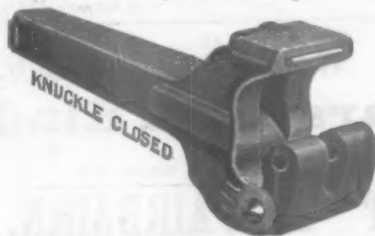
GEO. A. BANNANTIN,  
Sec'y.

THE SURVIVAL OF THE FITTEST.

Van Dorston Cushioned Car Coupling Equipment Co.  
VAN DORSTON CUSHIONED CAR COUPLER.

M. C. B. TYPE.

Lightest, Strongest and Best. Automatic Self-Opening and Self-Adjusting. Insures  
Safety to Trainmen. Independent Double-Acting Gravity Lock.  
No Slack Required to Uncouple.



Also the Van Dorston Single, Double and Triple-Acting Cushioned Draught  
Gear. Seventy-five per cent. reduction in shocks on the part of the couplers and car  
bodies, and consequent great economy in repairs. Increase in yard room of from 12 to  
18 cars per 1,000. Correspondence respectfully solicited.

Van Dorston Cushioned Car Coupling Equipment Co., No. 305 Walnut St.,  
Philadelphia, Pa.  
H. HAMILTON, Superintendent. EDWARD H. JOHNSTON, President.

E. G. KENLY, General Manager.

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STORED HEAT IN EARTHENWARE TUBES.

## MORTON SAFETY HEATING COMPANY.

BEING USED ON THE FOLLOWING ROADS:

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United States Railroads:

Chicago, St. Paul, Min-  
neapolis & Omaha.

Norfolk &amp; Western.

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burg & Potomac.

This system of heating is now in successful operation on the GRAND TRUNK and IN  
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MINNEAPOLIS & OMAHA, RICHMOND, FREDERICKSBURG & POTOMAC, and ROAN-  
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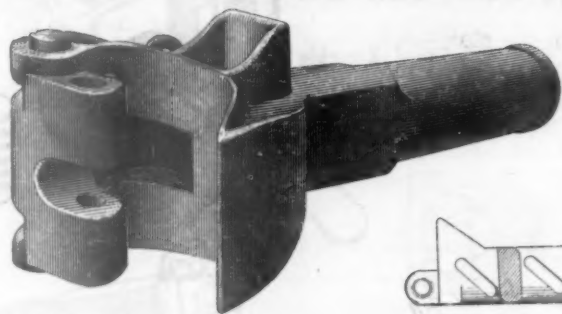
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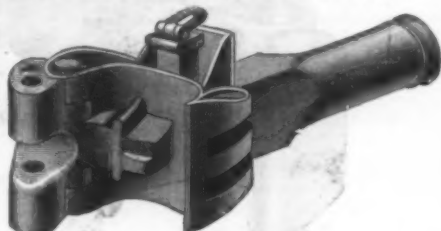
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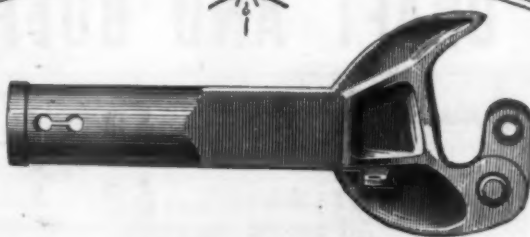
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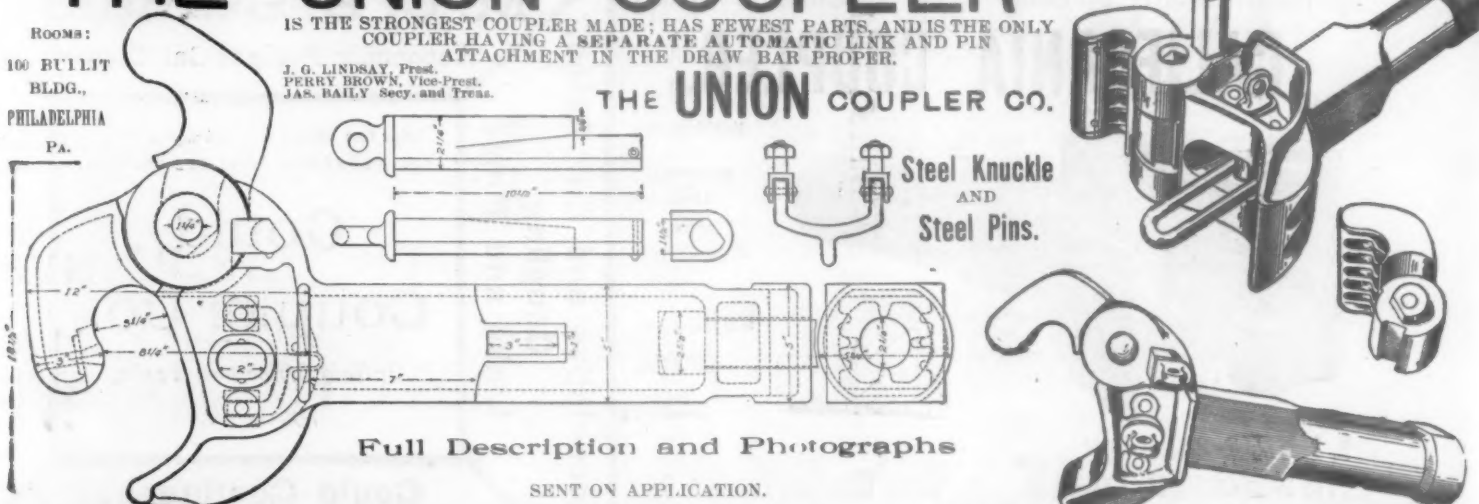
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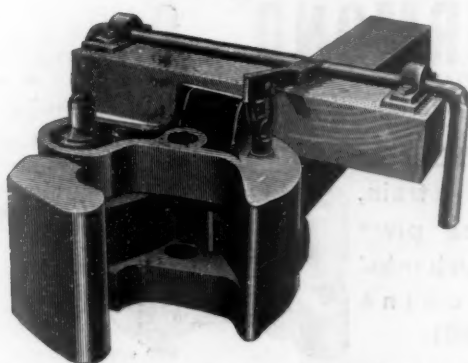
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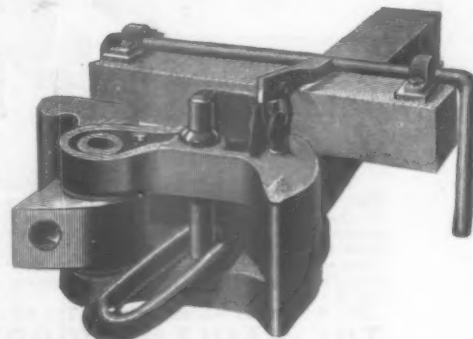
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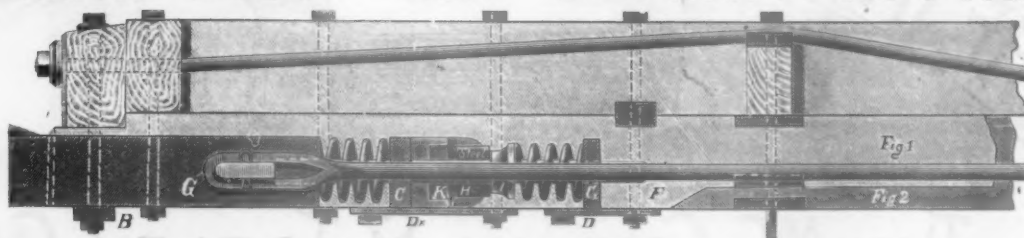
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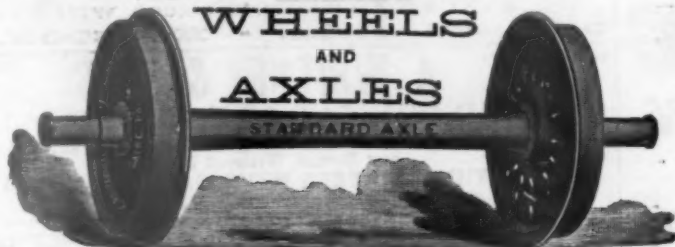
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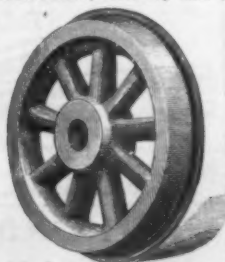
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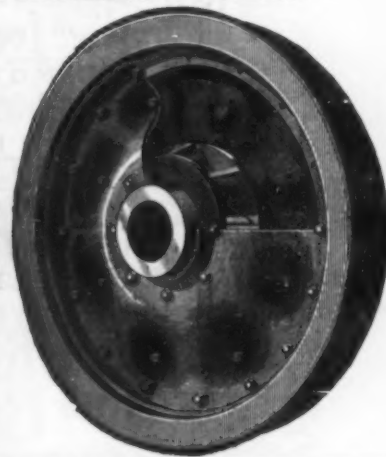
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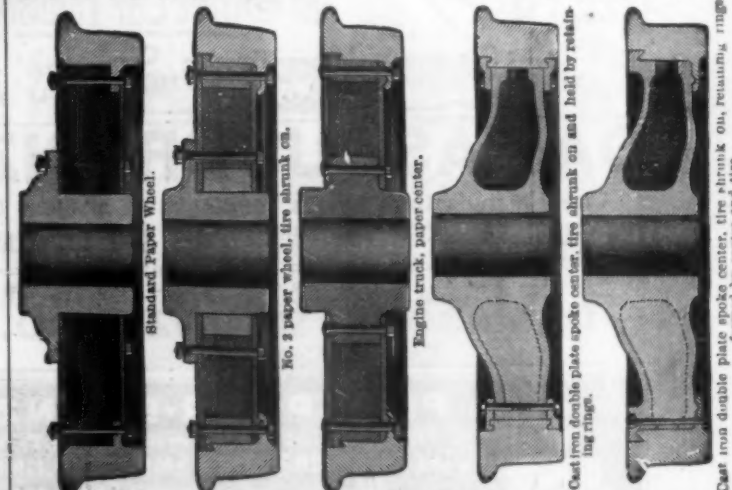
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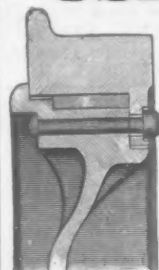
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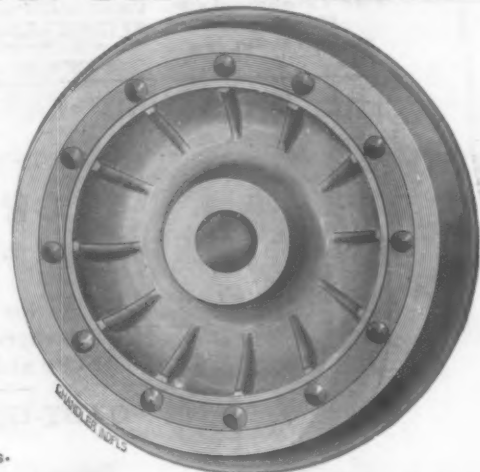
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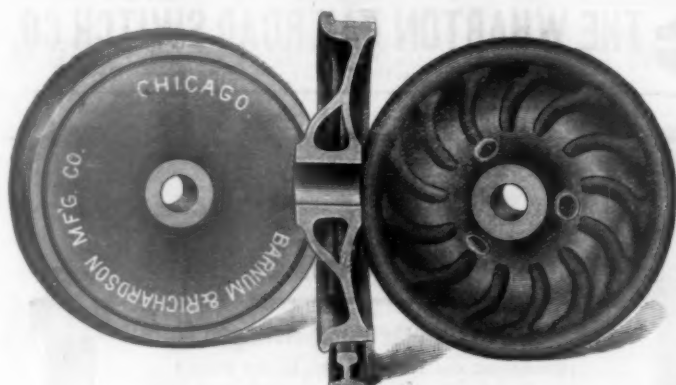
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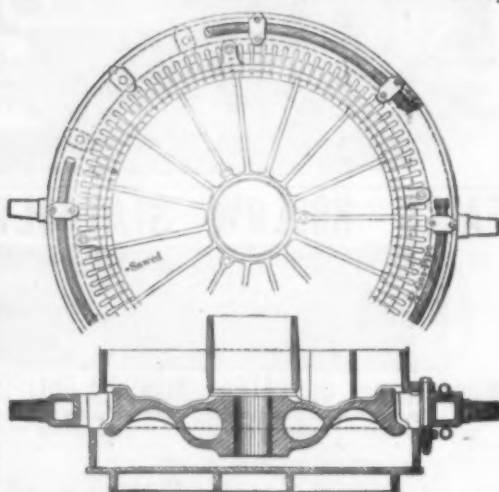


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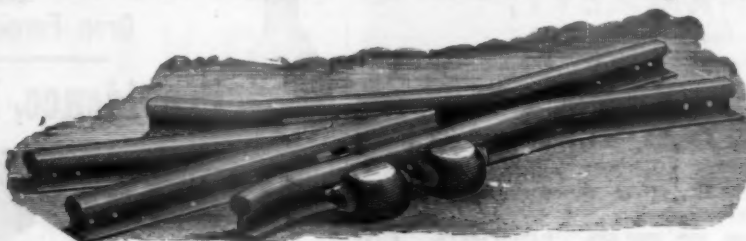
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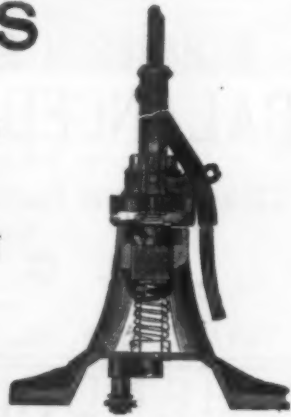
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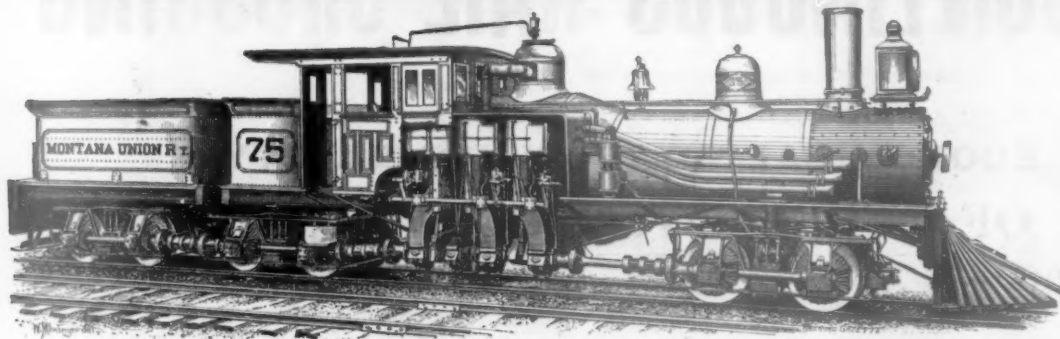
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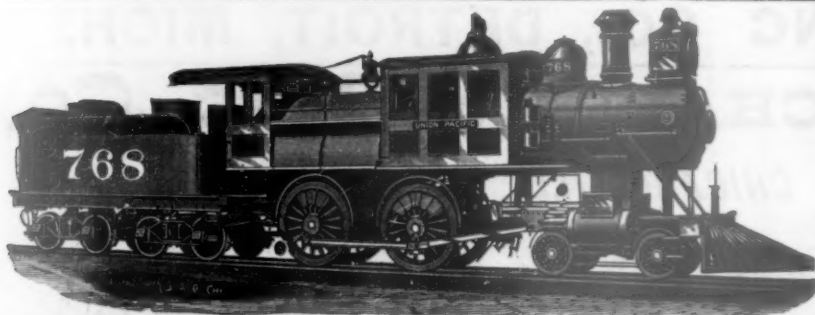
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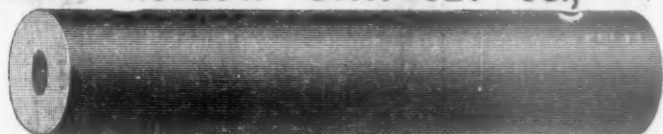
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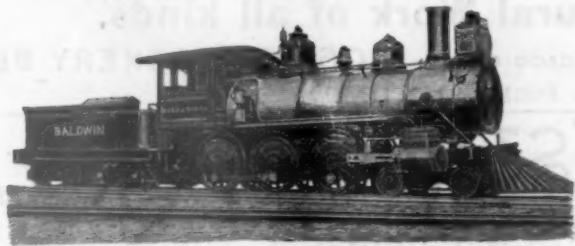
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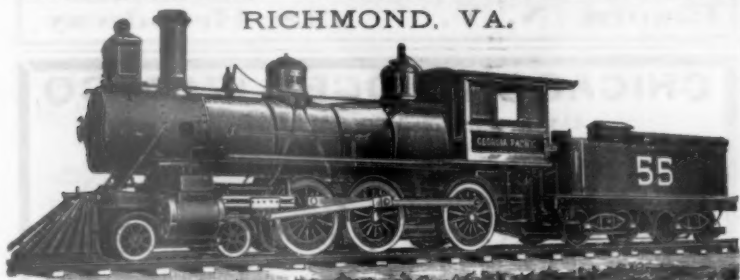
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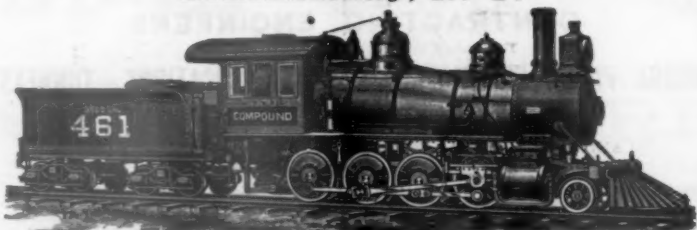
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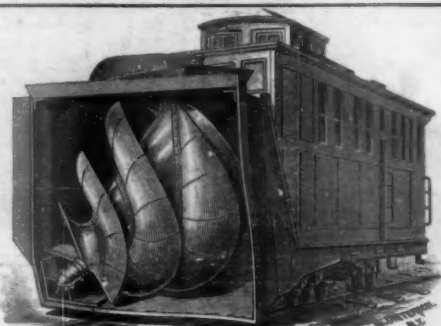
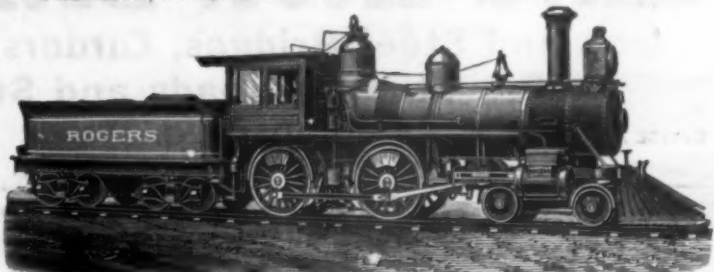
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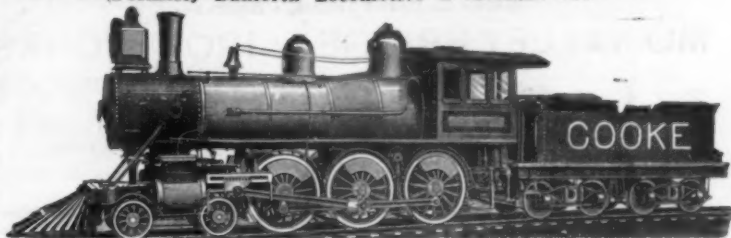
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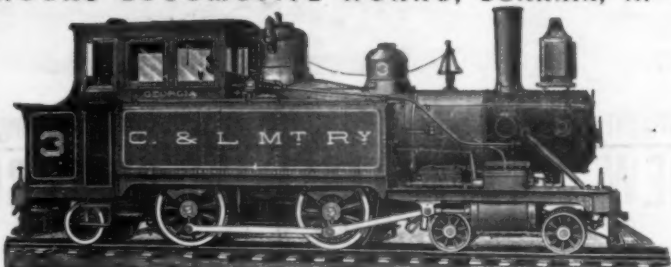
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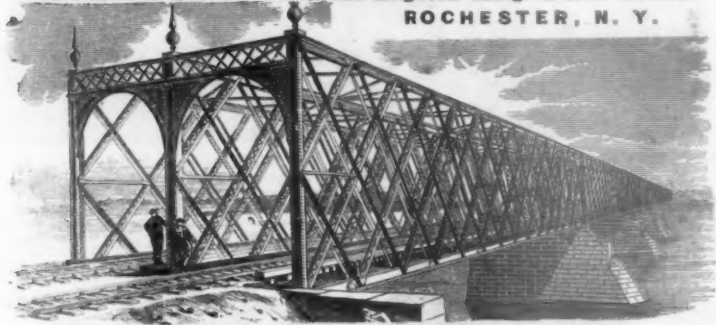
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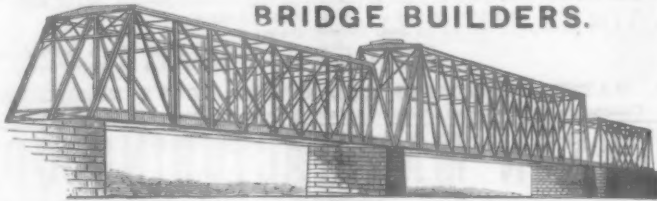
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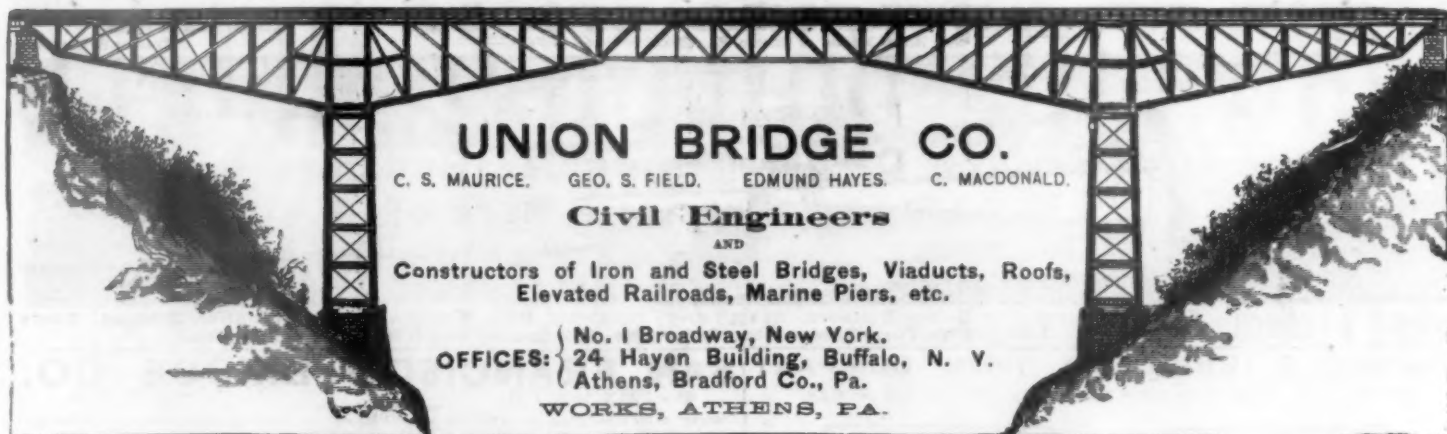
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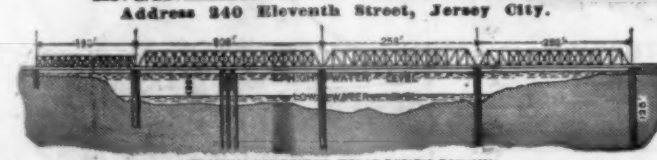


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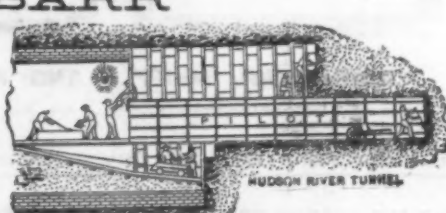
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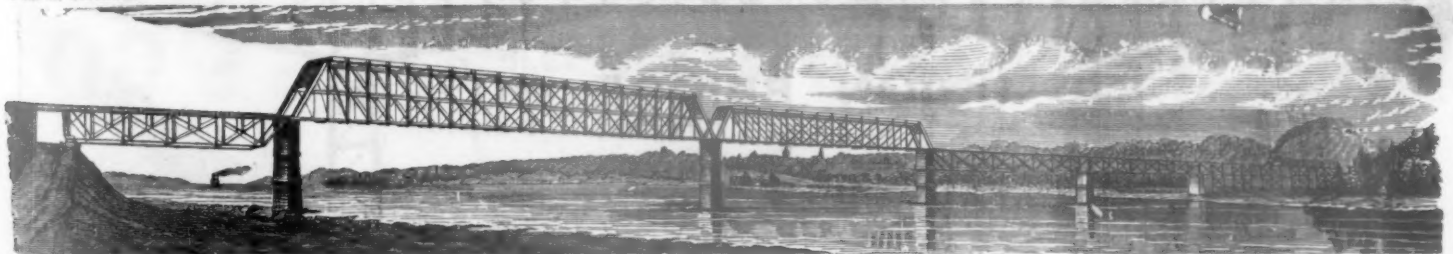
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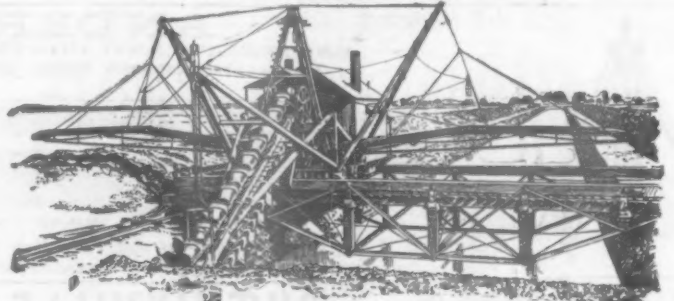
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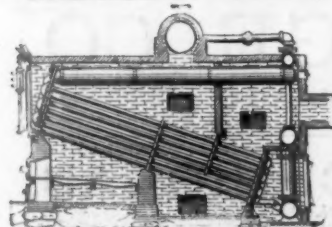
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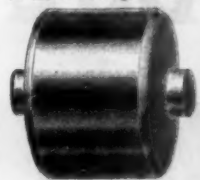
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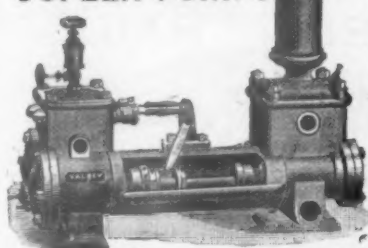
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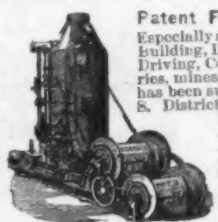
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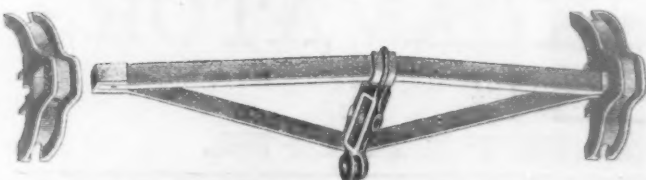
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